RAILROAD GAZETTE

FRIDAY, NOVEMBER 4.

NEWS OF THE WEEK.

We give below, in a condensed form, the leading news items of the week. These items will be found in detail in their appropriate columns.

Meetings Next Week.—Indiana & Western; Manhattan.

Personal.—A. S. Winslow resigns Presidency of Cincinnati, Hamilton & Dayton.

Elections.—Atlantic & Danville, Thomas Ewing, President.—Chesapeake & Ohio, W. C. Wickham, Receiver.—Chicago & Atlantic, M. B. Thomas, General Superintendent.—Cincinnati, Hamilton & Dayton, Julius Dexter, President.—Danville & Seaboard, W. T. Sutherlin, President. Fort Worth & Denver City, C. F. Meek, General Manager.—Hawesville & Pellville Mineral, D. L. Adair, President.—Indianapolis, Decatur & Springfield, C. E. Boyle, Superintendent.—Pennsylvania Co., James McCrea, Fourth Vice-President.—Seymour & Southwestern, F. M. Swope, President.

New Companies Organized.—Deming, Sierra Madre & Pacific obtains charter in New Mexico.—Dubuque & Northeastern is incorporated in Illinois.—Dubuque & Southwestern obtains charter in Illinois.—Hawesville & Pellville Mineral is incorporated in Kentucky.—Inter-state & Denver files charter in Kansas.—Palatka, Lake Harris & Gulf obtains charter in Florida.—Seymour & Southwestern is organized in Indiana.

Changes and Extensions.—*Alabama:* Memphis & Charleston will extend line to Scarborough.—*Arkansas:* St. Louis & San Francisco opens extension from Jensen to Mansfield.—*Kansas:* Kansas City, Wyandotte & Northwestern is completed to Holton; Atchison, Topeka & Santa Fe begins work eastward from Fort Scott.—*Michigan:* Chicago, Kalamazoo & Saginaw will be extended 95 miles.—*Missouri:* Chicago, Milwaukee & St. Paul completes Kansas City line.—*Nebraska:* Fremont, Elkhorn & Missouri Valley open to Hastings.—*Ohio:* Lancaster & Hamden begins work.—*Tennessee:* Cincinnati Southern begins work between Clinton and Oliver Springs.—*Texas:* New road being built from Burnet to Marble Falls.

Earnings.—Gross and net earnings for September are reported by 14 roads, 2 reporting a decrease in gross and 5 a decrease in net. The total net increase is 33.4 per cent.; 4 roads report gross and net earnings for the three months to Sept. 30; 15 roads report gross and net earnings for the nine months to Sept. 30. The total net increase is 36.1 per cent. For the year ending June 30, 8 roads have reported, the total net increase being 12.5 per cent.

Traffic.—Anthracite coal shipments for the week ending Oct. 29 show a decrease of 10.4 per cent., as compared with the same period last year; bituminous shipments show an increase of 26.9 per cent. Cotton receipts, interior markets, for the week ending Oct. 28 show a decrease of .3 per cent., as compared with the corresponding week last year; shipments show an increase of 2.4 per cent.; seaport receipts show an increase of 14.1 per cent.; exports an increase of 40.9 per cent.; cotton in sight is greater than at the same date last year by 4.6 per cent.

Contributions.

Strains in Locomotive Side Rods.

ALTOONA, Oct. 19, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the *Gazette* of Sept. 16, 1887, appeared an article entitled The Problem of the Locomotive Side Rod or Coupling Rod, written by Prof. J. B. Johnson, of St. Louis.

In that article Prof. Johnson holds that on fast running locomotives all other stresses are insignificant, as compared to that from the centrifugal force. That this theory is incorrect, and that the force which tends to buckle the rod needs as much attention as the centrifugal force, and in some cases even more, will be seen if it is demonstrated that the I-shaped section proposed by Prof. Johnson, and which we will admit is strong enough for the centrifugal force, is not strong enough to resist buckling.

To do this we will take the same engine, for which his side rod was designed, where the length (c. to c. of pins) is 100 in., and as the diameter of the cylinders and the pressure was not given, we will assume the diameter to 18 in. and the pressure at 125 lbs. per sq. in. We will also assume that as the engine is a passenger, it has four coupled wheels.

Then the direct thrust on the piston is:

$$P = \frac{d^2\,\pi}{4} \cdot p. \qquad (1.)$$

When d = diameter of cylinder in inches.

p = pressure per square inch in cylinder.

And the thrust on the side rod

$$P_1 = \frac{1}{2} \cdot \frac{d^2\,\pi}{4}\, p. \qquad (2.)$$

The rod may be considered as a loose standing column compressed in the direction of its length. Then

$$P_1 = \frac{\pi^2}{M} \cdot \frac{I \cdot E}{l^2} \qquad (3.)$$

When I is the moment of inertia of the cross-section of the rod, E the modulus of elasticity = 27000000, l the length from c. to c. of pins, M the factor of safety, which for for wrought iron should not be less than 5 to 7, and for steel 4. Then

$$I = \frac{P_1 \cdot M\, l^2}{\pi^2 \cdot E} \qquad (4.)$$

Substituting the proper figures we get

$$I = \frac{15.904 \times 5 \times 100^2}{3.1416^2 \times 27{,}000{,}000} = 2.98.$$

This would be the moment of inertia for the bar to resist buckling, but the I shaped section proposed by Mr. Johnson, and which is herewith reproduced, is much smaller.

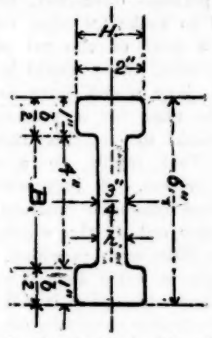


Fig. 1. Neutral axis coincident with centre line of web.

For this section the moment of inertia is

$$I = \frac{b \cdot H^3 + B \cdot h^3}{12} \qquad (5.)$$

Substituting figures we have—

$$I = \frac{2 \times 2^3 + 4 \times 0.75^3}{12} = 1.47.$$

This shows that although the rod with the above section is strong enough for the centrifugal force, it is only one-half as strong, or as 1.47 is to 2.98, as it should be to resist buckling.

It would therefore lead to serious errors to assume that the centrifugal force is the only one which need to be considered when designing a side rod.

It is, however, perfectly proper to make the rod deep enough to resist the centrifugal force, but due regard must also be had for the stress which tends to buckle it.

A rod for the before-mentioned engine strong enough to resist both forces, should be of the following cross section:

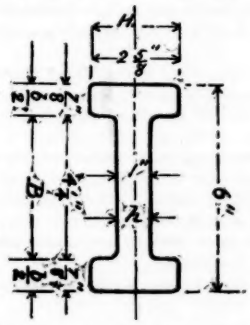


Fig. 2. Neutral axis coincident with centre line of web.

The moment of inertia of this section to resist buckling is

$$I = \frac{b \cdot H^3 + B \cdot h^3}{12} = \frac{1.75 \times 2.625^3 + 4.25 \times 1^3}{12} = 2.98.$$

which is exactly what was found to be required by formula (4).

And the moment of inertia to resist the centrifugal force is

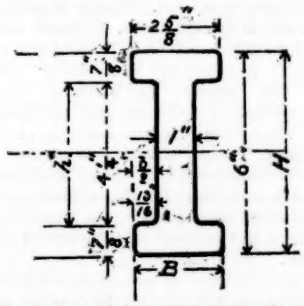


Fig. 3. Neutral axis perpendicular to web.

$$I = \frac{B \cdot H^3 - b \cdot h^3}{12} = \frac{2.625 \times 6^3 - 1.625 \times 4.25^3}{12} = 3.68.$$

If we then insert this inertia in Prof. Johnson's formula for centrifugal force, $f = \frac{M\,h}{2\,I}$ and make the proper substitutions, the strain on the outer fibres will be about 12,200 lbs., which is so nearly within the limit of 12,000 lbs. given by Mr. Johnson that this cross-section will be correct for both stresses.

We can further see that the force which tends to buckle a bar is in some cases so greatly in excess of the centrifugal force that very little attention needs to be given to the latter.

For example, take a four-coupled freight engine having:

Length of rod (centre to centre of pins) = l = 52 in.

Length of stroke, in inches = s = 24 in.

Diameter of driver, in inches = d = 50 in.

Radius of crank, in feet = r = 1 ft.

Velocity of train, in miles per hour = v = 50.

Cylinder pressure, in pounds, per square inch = p = 125.

Diameter of cylinder, in inches = D = 20.

Then the centrifugal force would require the depth of a rectangular rod to be:

$$h = \tfrac{1}{6}\,\frac{s}{f}\left(\frac{l\,v}{d}\right)^2$$

Which, by substituting figures, will only give:

$$h = \tfrac{1}{6}\,\frac{24}{12000}\left(\frac{52 \times 50}{50}\right)^2 = 1.66 = 1\tfrac{43}{64} \text{ in.}$$

Then, if we assume this to be the depth of the rod, the thickness or breadth necessary to resist buckling is found as before by formulæ (2) and (3), wherein P_1 for an eight coupled engine is the same as for a four coupled.

We also find by formula (4) that the moment of inertia must be equal to $\frac{P_1 \cdot M \cdot l^2}{\pi^2 \cdot E}$, which by substituting figures gives

$$\frac{19{,}635 \times 6 \times 2{,}704}{9.87 \times 27{,}000{,}000} = 1.19.$$

And as the moment of inertia for a rectangular rod is $I = \frac{b\,h^3}{12}$, and $b = \frac{I \cdot 12}{h^3}$, therefore the breadth of the rod will be $b = \frac{1.19 \times 12}{1.66^3} = 3.124 = 3\tfrac{1}{8}$ in. We would then have a rod $1\frac{43}{64}$ in. high by $3\frac{1}{8}$ inches wide.

But a rod of such a shape would look very singular, therefore, as the centrifugal force in this case has been shown to have no value, and as the buckling stress determines the size of the rod, and as the most economical section of a solid column to resist bending is a square section, it seems plausible that the side rod for an engine of this kind should have a square instead of a rectangular cross section.

If we then convert the moment of inertia found for the rectangular section into a square section we get

$$I = \frac{b^4}{12} \text{ and } b = \sqrt[4]{I \cdot 12} \qquad (6.)$$

and insert I then b, or the side of a square, equal in strength to the bar, $1\frac{43}{64}$ in. × $3\frac{1}{8}$ in., will be $b = \sqrt[4]{1.19 \cdot 12} = 1.94 = 1\frac{15}{16}$ in., to which a little would be added to allow the rounding of corners, say to 2 in. square.

The area of the square section would then be equal to 4 sq. in., as compared to the rectangular section of $5\frac{3}{16}$ sq. in., which is about 30 per cent. larger than the former.

This reduction in area, and consequently in weight in the same proportion, would reduce the size of the counter weights and besides make the rods easier to handle.

If the side rods are made of steel the strain in the outer fibres caused by the centrifugal force may be taken proportionally larger.

CHARLES LINDSTRÖM.

ST. LOUIS, Mo., Oct. 29, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have to thank you for kindly sending me the proofs of Mr. Charles Lindström's criticism of my letter on the strains on locomotive coupling rods. I will point out some of the errors he has fallen into and also endeavor to show that my original statements are correct.

Mr. Lindström has used the theoretical form of Euler's formula for columns, without any empirical constants. This should never be done. When properly evoluted, to adapt it to a series of experimental results, the formula is good for *very long columns*. In the form given,

$$P = \frac{\pi^2\,E\,I}{l^2}$$

no account is taken of the resistance of the bar except its *resistance to bending*.

I will determine the strength of the coupling rod I recommended, by referring directly to Christie's experiments on tees and angles. So far as bending sidewise is concerned, the column is *square ended* (not round ended as Mr. Lindström has assumed), and therefore we will refer to the experiments on square ended T columns, found in *Trans. Am. Soc. Civ. Engrs.*, 1884, *p.* 122, *pl. xxvi*. But first we must find the ratio of l to r (length to least radius of gyration) for the proposed coupling rod, fig. 1 above. The value of I is found to be 1.47. The area of the cross-section is 7 in. But $r^2 = \frac{I}{A} = 0.21$, whence $r = 0.46$ in. The length is 100 in., hence $\frac{l}{r} = 217$. Substituting the value given in Mr. Christie's table of $\frac{l}{r}$ we find p = 12,000 lbs. per sq. in. *by actual experiment*. If we introduce a factor of safety of 5 (as Mr. Lindström has done), we obtain a working stress of 2,400 lbs. per sq. in., or 16,800 lbs. for the side rod I proposed.

Since this is somewhat larger than the piston thrust can ever be, it evidently more than satisfies Mr. Lindström's conditions.

We have thus shown that the greatest direct stress on this side rod can never be 2,400 lbs. per sq. in., while the stress from centrifugal force will be 12,000 lbs. per sq. in. for a velocity of 70 miles per hour. That is to say, the fibre stress from centrifugal force is *five times* that from the piston thrust. Since these two will never occur simultaneously, I think my statement was warranted that the direct stress is insignificant as compared to that from centrifugal force in fast running locomotives.

Even for the freight engines cited by Mr. Lindström, if he will take the same factor of safety as he did for the passenger engine, 5, and correct an error in figuring, he will obtain a height of 1.8 in. for centrifugal force, and then a breadth or $2\frac{1}{8}$ in. instead of $3\frac{1}{8}$ in., which is nearly a square bar, and not a bad shape for this particular type of engine. I fail to see, therefore, wherein any of the criticisms are well taken. I have nowhere recommended that freight engine

side bars be designed mainly with reference to centrifugal force. Of course *both* centrifugal force and direct thrust should be considered, and the bar proportioned to carry both with safety. J. B. JOHNSON.

A Question of Ethics.

OCTOBER 18, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I send you with this a specimen of the timber, of which a large quantity has been used in the construction of the trestle work on this road. Understand, it is not a stick used here and there, but generally. For example, in trestle No. 7, out of 48 stringers, there were 45 condemned; in No. 8, 32 stringers, 28 condemned, etc. It is perhaps superfluous to state that all of this timber *had* been condemned, and so marked, but was introduced by the order of the President, who excused himself by saying "It's the best we can do." The President spends most of his time upon the work, and, as is the case generally with men ignorant of railroad building, has extraordinary ideas of economy, and is much given to interfering in the work and giving his own ideas and instructions in place of mine. My position becoming unbearable, the executive committee and directors to whom I reported not rectifying the matter, I resigned, much to their surprise. Overtures being made by one of the directors who represented the county subscription, backed by all the stockholders at hand, I returned, as they directed, *to see it out*. Please inform me what course should be pursued by an engineer under such such circumstances who desires to be honest to himself, to his profession and to the public. ENGINEER.

[The specimen of oak which you send is hardly fit for fire-wood. To put it into a railroad trestle is simply wicked. An eminent engineer to whom we showed your letter, says that if you stay on the work and any one is ever killed by the fall of one of those trestles you ought to be hanged. That, perhaps, is an treme view of your duty. Doubtless in analyzing this matter for your own decision you have thought of the effect of your action under the following heads: Your own self-respect; your duty to your employers; your duty to the public; your professional reputation: your obligations to other engineers. You must have considered that your self-respect will not allow you to occupy a place where your judgment in matters in your own department is so completely overridden, unless there are important and *unselfish* ends to be served. You might suffer a sort of minor martyrdom and think the better of yourself for it. Your duty to your employers requires that you should make known to them your opinion of the danger of using the rotten timber and your desire to have no hand in it. But it may also require you to stay and protect them from bad practice in other matters. Your duty to the public takes the same shape. You must use all proper means to prevent the building of the dangerous trestles; but if you cannot prevent it you may still serve the public by staying where you are, better than by resigning. Your professional reputation can hardly escape injury if you stay, whatever your motive. Your duty to other engineers requires that you should refuse to do shabby engineering work under any circumstances. In that way only can you uphold the professional standard. It is evident, therefore, that you ought to resign unless you see very clearly that by staying you can be of such service to your employers and to the public as will compensate for loss of self-respect, loss of reputation and injury to the profession.—EDITOR RAILROAD GAZETTE.]

Tickets and Gatemen.

NEW YORK, Oct. 20, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I remember you once said something about the wretched practice of making all the passengers who use a great depot file through a narrow wicket, and you pointed out the lack of ingenuity which compels people, year after year, to endure the hustling and crowding of the human cornucopias which form at the ticket gates. To be at the big end just at train time is worrying; but to be at the little end endangers one's ribs. Especially is this so at the Grand Central depot. But I do not write to complain of the narrowness of the entrance to New England and the wild West; I have another grievance. In early September I entered the Grand Central depot at one minute before four o'clock on a Saturday afternoon. I was intending to go to Saybrook, Conn. The train is advertised to leave at four o'clock. As I say, I arrived one minute before that time. A queue of people stretched away from the ticket seller's window. If I joined the line I should surely miss the train, so I undertook to go through the gate without my ticket; but I did not get out. The gateman was too big and too resolute. Perhaps I might have bribed him, but I was too mad to think of that. The result was that I took the 11 o'clock train, paid five dollars to be driven to my destination, as there was no train connecting with that by which I went, and I caught a cold from which I still suffer.

Now I want to know if a man who is in the station one minute before the advertised train time is not entitled to get on to the train, and if the railroad company cannot be held liable for such damages as may ensue from the delay which he suffers in losing it? A VICTIM.

[In the first place, you spoiled your case by trying to get out by an irregular way. Had you followed the rule and custom you would have had good ground of complaint. As a matter of policy, sufficient ticket windows and clerks should be provided to supply passengers with tickets without subjecting them to crowding or anxiety. The same is to be said of gates for the inspection of tickets. These are matters in which the convenience of travelers is often, perhaps ordinarily, not sufficiently thought of; and to make traveling convenient and comfortable is a part of the art of railroading. As for legal liability, there would be many things to consider. A jury would have to judge what was a reasonable time for a passenger to allow himself in which to get his ticket and get to the train. That might be a minute or it might be more or less. A jury would also have to decide what were reasonable facilities for procuring tickets and getting out of the waiting room, and whether such facilities were provided. Under some conditions it might be ruled that it was the duty of the company to hold a train, but it will be at once apparent that such a course should be adopted very seldom.—EDITOR RAILROAD GAZETTE.]

Railroads in China.

KAIPING, China, Aug. 20, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I am much tickled at seeing in your paper the grave announcement that the Viceroy Li had "opened" the railway from Taku to Teintsin a few weeks before permission to build the line was granted by the Throne. The Minister at Berlin must have been playing Bismarck a practical joke, or affording pabulum for the somewhat lethargic Teuton press,—anyhow, the papers all over the world have repeated it, so it may be worth while to explode the fallacy.

The China Railway Co., lately known as the Kaiping Railway Co., Limited, has been empowered by the government to build the line from Tientsin to Taku, and from Taku to Lutai, joining with the Lutai-Kaiping Railway, built by it last year. The length of new line now building is about 60 miles. The earthworks and bridge abutments are well advanced, and rails (6,500 tons) are expected to arrive next month.

One bridge is being built in the Unted States and others in England, where low prices secured most of the orders. The rolling stock will be all of American type, but with somewhat better detail, it being unwise to ship inferior goods such a great distance, and where repairs are costly.

Wooden sleepers are exclusively used, being fairly cheap and of good quality. The rails are 70 lbs. and 60 lbs. to the yard, Sandberg section, and angle fish plates. About 40 bridges from 30 ft. to 800 ft. are under construction, all girders being of iron or steel.

The line, including rolling stock, etc., complete, will cost about £5,000 per mile. TRUTH.

The Railroad Officers' Associations.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have just read your editorial in to-day's issue on "The Railroad Officers' Associations." This is a matter concerning which I beg to make a suggestion. Let us model the General Time Convention after the plan of the American Association for the Advancement of Science. Change its name, which is obsolete, and call it the American Railroad Association. Amalgamate into this the General Time Convention, the Superintendents' Association, the Master Mechanics' Association, the Master Car-Builders' Association, the Car Accountants' Association, and the Roadmasters' Association. Hold one annual meeting of three or four days duration, the convention to be divided into sections each for the consideration of special branches of railroad work, as is now done by the separate conventions. Make the membership fee nominal. The expenses of the annual meeting to be met as those of the General Time Convention are now.

If this plan could be taken up and considered by each association at its spring meeting it could be brought about and adopted by October, 1888. SUPERINTENDENT.

The Roadmasters' Convention—A Correction.

CHARLESTON, S. C., Oct. 31, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of the 28th inst., in your editorial on the Roadmasters' Convention at Cleveland, O., I am reported on the subject of guard rails for frogs thus: "The President of the Association was of the opinion that the guard rail should run the whole length of the track." I beg leave to state that I am not correctly reported. What I did say, was, "the whole length of the frog," and not "the whole length of the track," as stated.

J. W. CRAIG, President R. M. A.

[The report of the official stenographer was our authority for President Craig's words, which we took to be a little pleasantry, thrown in to enliven the discussion.—EDITOR RAILROAD GAZETTE.]

Box Car Bodies.

It is very important that the body of a box car should be properly braced. The accompanying illustration represents three different methods in very general use, and the dimensions, etc., are taken from actual examples of the latest practice in ordinary box cars of large size.

The accompanying table shows the dimensions of the principal parts of the three cars:

PRINCIPAL DIMENSIONS OF BODY FRAMING.

	Fig. 1.	Fig. 2.	Fig. 3.
	ft. in. Mat.	ft. in. Mat.	ft. in. Mat.
Length over end sills	34 6	34 0	36 4
Length over body	....	....	34 8¾
Height, sill to plate	7 0	6 9	7 0
	in. in.	in. in.	in. in.
Side sills	5 × 9 pine	5 × 9 pine	5 × 9 pine
End sills	9 × 9 oak	7 × 9 oak	8 × 9 oak
Transoms	6 ×16 pine	6 × 9(4)oak	6 ×18 oak
Tie beams	4½× 6½ oak	4 × 7½ oak	
Corner posts	5 × 5 pine	5 × 4 pine	5 × 6½ pine
Door posts	4 × 4½ pine	5 × 3 pine	4½× 4⅞ pine
Braces	3 × 4 pine (Six per side.)	4 × 2½ oak	2 × 5 oak
Intermediate posts	. .....	4 × 2½ oak	.....
Belt rail	3 × 4 pine	3½× 3 oak	4 × 4 pine
	ft. in.	ft. in.	ft. in.
Do. above top of sill	3 9¾	3 9	4 0
	in. in.		in. in.
Sub-belt rail	.....	.. ..	1¼ × 8 oak
Side plate	3 × 6 pine		
Corner posts, rabbeted, for inside lining	2 × 2		
Door posts, rabbeted, for inside lining	1 × 2½		
	ft. in.	ft. in.	ft. in.
Centre of transom from end of car	4 8½	5 0	5 0
Door opening	.....	5 8	6 0

In the car body shown in fig. 1 the bottom of the braces and posts rest in cast-iron pockets, which are held in position by dowels, on the bottom, 1 in. × 1 in. These pockets are not shown in cut. The top of the braces and posts are tenoned in side plates, tenons being 1 in. × 1 in. × 4 in. on braces and corner posts, and 1 in. × 1 in. × 4½ in. on door posts; the whole being confined by ten ¾ in. vertical and angular rods, and two ½ in. horizontal rods, as shown in cut; centre of transom being 4 ft. 8½ in. from end of car.

This is not altogether a satisfactory design, the objection being that, first, it is not sufficiently rigid to withstand the severe shocks to which all freight cars are subjected. The tendency is, after a continual bumping and jerking, to create a vertical vibration which will cause the braces and the nuts on the vertical and angular rods to work loose, thereby necessitating considerable attention in order to keep the car well tightened up. Second, there is not sufficient support to hold up the ends of the car, and thirdly there is too much wood cut away from the side plate where the braces and rods meet.

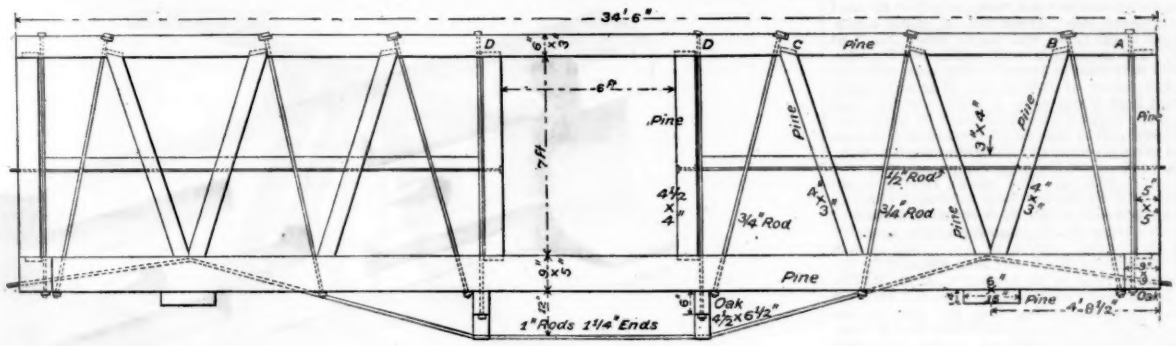
The latter is the most serious objection. On the top of the plates there are slots cut all the way across, 1 in. deep and 3 in. wide, to receive a cast-iron plate which acts as a washer for the rods. Immediately under these slots there are others cut all the way across, 1 in. deep and 4 in. long, to form shoulders for the braces, and in these slots there are mortises cut 1¼ in. deep, 1 in. wide and 4 in. long, to receive the tenons on the braces as shown. It can be noticed in the cut that the shape of these slots and their relation to one another form dangerous nicks, the stick being nearly severed at each of these places. These sticks have been broken at *B* in screwing up the rod at *A*, while the cars were being built, and again they broke at *C* while screwing up the rod at *D*, these points being fulcrums in screwing up the rods, in conforming the plates to the camber of the sills.

Care must be taken in screwing up these rods to avoid throwing the car out of square at the door. These cars are provided with the "Wagner door," and if the opening does not conform to the door it will not go up in its place. This trouble will occur if one side of the door is screwed up more than the other.

The car shown in fig. 2, in size and dimensions, is nearly the same as in fig. 1, but the sides are much more rigid. It has the same number of braces and rods, and in addition to this it has a post placed at each brace, as shown. These posts obviate the trouble which occurs in the car shown in fig. 1, and the manner in which the transom-post, corner-brace and rods are arranged form a very good support of the ends.

The chief objection to this car (fig. 2) is the intermediate posts and rod heads being let into the plate. All practical men know the disadvantage of letting bolt-heads into soft wood. When *A A* are placed outside as at *B B*, a large washer can be used, which is an indispensable article for the side rods of a car. It can be readily seen that a side braced in this manner can stand much greater longitudinal shocks than that shown in fig. 1. The dimensions and material of this car are given in the table.

Fig. 3 shows a perfect design with one exception. If the rods *B B*, with good broad washers under their heads, were adopted, instead of being let down into the wood with iron plates under their heads, shaped as shown at *A A*, there could be no objection whatever. The braces rest in cast-iron pockets top and bottom, as shown. These pockets are held in position by dowels 1 in. × 1 in., together with the rods which pass through them. The bottom pockets are placed on the top of the floor. This is essentially the design proposed by Mr. John W. Cloud, and largely used on the Pennsylvania.



TYPES OF BOX CAR FRAMING.

The New England Roadmasters' Association.

The annual convention of this body was held at Hartford, Conn., on Oct. 19 and 20. A brief account, giving the election of officers, was published last week.

The first subject discussed was economy of labor and material in the maintenance of way. The general opinion was that the force must be varied largely at different seasons of the year, according to pressure of work and facility of hiring men. The opinion was expressed that many foremen, perhaps most, are unequal to the task of working large gangs economically. The testimony of the men from the northern states went to show that the severe winters in that region necessitate a larger force during the cold season than is required in Massachusetts and Connecticut. The northern men say they have to begin putting in new ties before the frost is out of the ground in order to finish renewals in season.

In discussing the proper length of sections, it was generally thought that the prevailing practice of having 4½ to 6 miles to a section was expensive; in long sections much valuable time is lost by the men in going to and from work, while on the other hand, with short sections, the work in winter will not keep a minimum force busy. A resolve was finally passed that it was the sense of the association that sections on double track should be not over 3 miles long, and on single track not over 4½ miles; and that not less than one man per mile for single track and two per mile for double track is the proper amount of help, averaged for the whole year.

GUARD RAILS FOR FROGS AND SWITCHES.

The Committee reported the following resolution:

That the best form of guard rail is from 12 to 15 ft. in length, curved the whole length with a radius of 150 to 175 ft., with the centre 6 in. ahead of the point of frog, securely spiked and kept from tipping by three braces, one opposite the point of frog and one on either side. This report was adopted by a majority vote after considerable discussion. The discussion showed a great variety of practice. Those who advocated guarding only the point claimed that wheels should not be drawn against the wings of the frog. By compounding the curve and leaving a short tangent each side of the frog and keeping the main rails strictly to gauge, it was claimed that wheels in properly made trucks would never strike the guard rail at all. Many members told of considerable difficulty in keeping guard rails from turding over. President Stevens bends the ends of the guard rail around at right angles and spikes them down, getting satisfactory results in this way. Mr. Nevens (Maine Central) had not been able to make this plan work. He found it necessary to cut off the head of the rail and bend the foot at right angles the other way, fastening it *underneath* the main rail.

GUARD RAILS ON BRIDGES.

This Committee made a report, referring to two serious accidents caused by the absence of a guard rail, and a third case where a guard rail had guided a derailed truck safely across a long bridge, although the wheels were 18 in. to one side before they reached the guard rail. This was on the high Frankenstein trestle of the Portland & Ogdedsburg, in the White Mountains. The recommendations of the report specified "a strong floor, consisting of cross ties 10 ft. long, 8 × 8 in. and 8 in. or less apart, secured in place by a timber 6 × 7 in., notched to each tie near the outer end and bolted firmly. Guard rails to be placed inside of main rails and 8 in. from them, approaching the centre of the track at about 30 ft. from the ends of the bridge, and connected by an old frog point." This report was unanimously adopted after being amended as follows: The 10-ft. ties should be used for a distance of 30 ft. beyond the ends of the bridge, and an outside iron guard rail should extend out from the end of the guard timbers on these ties, curving away from the main rail at the end. The discussion on this report evinced a lively interest in this subject on all sides, and it appeared that most of the roads represented now have some protection on nearly all their bridges. The suggestion that the outer guard rail should be extended to some distance beyond the inner, for the purpose of bringing wheels back into line, provided they had got more than 28 in. out of line, met with both favorable and unfavorable views. An amendment was offered that ties should be 4 in. apart, but was lost by a close vote.

FOOT GUARDS AT FROGS, ETC.

The Committee on this subject reported in favor of a piece of plank fitted into the space as the best device they knew of. One member who had used cast iron said that sleet in winter would accumulate and freeze down to such an extent that passing wheels would break the castings. A member who uses a Hart foot guard has some fault to find with it, but deems it the best device now known. The Committee's report was finally adopted.

HAND CARS, NUT LOCKS, SLEEPERS AND SPLIT SWITCHES.

Crank hand cars were condemned as dangerous, and pump cars were advocated as easier to work on an up grade. Many cars of the latter kind had been found with the gallows frame slightly too low for men of average height. The Committee on this subject reported that the Sheffield wood wheel steel tired pump car is the best.

The Committee on nut-locks offered the following resolution, which was passed after considerable discussion: "While the Pratt washer, Vulcanized Fibre and National nut-locks are each good devices, the Excelsior, double or single, made by Ruffner, Dunn & Co., is to be recommended for excellence and economy."

A resolution that sleepers should be 9 ft. long, 7 in. thick and 7 in. face was lost by a close vote, and the meeting then voted unanimously that ties for main track ought to be 8 ft. long, 7 in. thick, 7 in. face, and sawn or hewed on two sides only. Split switches were discussed, the general sentiment being in conformation of last year's resolve in favor of this as the best form of switch. It was the general experience of members that a guard rail should be used on all main track split switches where trains run against points in order to provide against the occasional splitting of a train by derailed wheels turning the switch, and a resolution to this effect was passed.

EXHIBITS.

The following were among the articles connected with track exhibited during the convention: The iron clad fibre washer nut locks made by the Vulcanized Fibre Co., of Wilmington, Del.: the National lock washer, made at Newark, N. J.: and the Excelsior double and single nut lock, made by Ruffner, Dunn & Co., of Philadelphia.

The Metzler Railway Lantern Co., of Philadelphia, showed their reversible lantern, which shows either a red or white light, and may be changed instantly from one to the other.

H. Chance, of Fostoria, O., showed his solid steel frog and a model of a newly invented crossing which dispenses with frogs entirely and leaves either track blocked when the other is clear.

The Sheffield Velocipede Car Co., of Three Rivers, Mich., had a very complete and interesting exhibit of their goods, including velocipedes, section hand cars, and the Dodge stand-pipe.

A model was shown of an expansion joint, the invention of a New Hampshire roadmaster, for use at the foot of grades and in any place where track gives trouble from creeping.

The well-known Bush interlocking bolts were shown by models and photographs; models of a reversible flanger and a combined guard rail and foot guard were on exhibition.

Frogs, switches and switch stands were exhibited by the Ramapo Iron Works and the Jersey City Iron Works.

Mr. A. C. Bean (Central Vermont) exhibited a birch tie 36 years old, which had been preserved by the Burnett process. The tie was sound and fit for further service.

The next meeting will be held in Boston on the third Wednesday in August, 1888.

The Iowa Commissioners on the Eagle Point Collision.

The Iowa Railroad Commissioners have sent to the Governor their report on the butting collision of passenger trains at Eagle Point, near Dubuque, on the Chicago, Milwaukee & St. Paul road, Sept. 19. As this was a serious and widely-known collision, resulting from a common but not easily remediable cause, we refer to it, even at a late day, in order that the facts may be on record and clearly set forth.

The Commissioners' recommendations are rather mild, being practically confined to a statement of what the dispatcher ought to have done in this case, and the expression of the opinion that it "would seem that the rules might be further modified," etc.

The report begins by rehearsing the facts. The telegraph stations in their order are, going north, Dubuque, Dubuque Shops, Specht's Ferry, Buena Vista, Turkey River. Peru is between Dubuque Shops and Specht's Ferry. The rules bearing on the case are: 1. The safety of passengers and trains is of the first importance, and all operations must be subservient thereto. 4. Special rules supersede general rules * *. In case of doubt take the safe course.

28. Two red flags by day and in addition two red lights by night, displayed on the front of the engine, denote that the train is followed by another train. 45. When there is more than one train running on the time of a regular train, the leading section or sections will carry red signals and the following section or sections will have precisely the same time-table rights as the leading section and no more. 104. In moving trains by special orders each section shall be taken and considered as a separate and distinct train, and shall receive and run only under special orders addressed to its own conductor and engineer.

There is no provision for the duplicate order system except the following:

106. Special orders for the movement of trains will be given in the forms herewith prescribed, and orders shall be sent when practicable to all the trains affected at one and the same time, but notices of obstruction to track, repairs of bridges, or other matter which cannot be expressed in said form, will be sent to trains in such forms as may be necessary to cover the case.

Some of the forms given are suitable for duplicate orders and others, which generally do not affect other trains' rights, are not.

Both enginemen, both firemen and one brakeman were lled; five trainmen and six passengers injured. The trains

met on a sharp curve where the view was only 300 ft., and there was besides a dense fog. Train No. 4, going south, and having the right to the road, was due to meet No. 3 at Peru at 6:51 a. m. The dispatcher sent order No. 5 as follows: "No. 3 and 4 will meet at Peru." This was received by No. 4 at Turkey River at 6:08 a. m. [The newspaper accounts stated that both trains were a little late, and that this was the reason for making a meeting point by telegraph; but the Commissioners' report says No. 3 arrived at Dubuque Shops on time, and gives no reason for the dispatcher's action.] The order was sent to No. 3 at Dubuque Shops, and received by that train there at 6.42 a. m. The report then goes on: Conductor Wolcott (No. 3) having been informed that an engine was to go north ahead of No. 3, as the first section of 3, refused to go under order No. 5, claiming to the operator that he was now the second section of No. 3, and as such must have orders. The order No. 5 was then changed by the dispatcher at Lacrosse to read in the head, "C. & E., 2d No. 3," with the body of the order still reading "No. 3." Wolcott started on his order, but discovering that the body of the order remained unchanged, he stopped the train, and in company with Engineer Winchester returned to the telegraph office and again refused to go under the order. Wolcott testified that while he was waiting for corrected orders, "the night dispatcher at Lacrosse said No. 4 was waiting at Peru."

Orders No. 7 and 8 read as follows: No. 7. Wolcott and engineer, Dubuque Shops, run second section No. 3, Dubuque shops to Turkey River, and No. 3 Turkey River to North McGregor. O. K., 6:42 a.m. No. 8, Wolcott and E., second No. 3 Dubuque Shops. Meet No. 4 at Peru. O. K., 6:58 a.m. The order to the first section of No. 3 was as follows: No. 6, Royce and engineer. Meet No. 4 at Peru, and run first section of No. 3, and carry signals Dubuque Shops to Turkey River. O. K., 6:42 a. m. [It will be seen that orders 5 and 7 were made O. K. at the same time.] The report says:

"These orders given by the dispatcher show a confusion in his mind as to the actual condition, he insisting that Wolcott should have gone on his first order. In changing the address of order 5 to read "C. & E. 2d No. 3" at the request of conductor Wolcott he did not change the order which directed "No. 3" to meet "No. 4" until Wolcott called his attention to this second error.

Conductor Royce, of the first section of No. 3, says that he carried the usual signals in front of the engine, viz.: Two red flags; that when he arrived near the switch at Peru the engineer gave the usual signals, and was properly answered by No. 4. He then ran slowly along until he came up opposite No. 4. Conductor Clark was standing on the front steps of the baggage car. I asked him, "Who are you?" He answered, "I am No. 4." I answered back, "I am 1st section of No. 3." I then pulled on to west end of switch, got off to throw switch, and discovered that No. 4 was gone. I left Dubuque Shops at 6:46, and arrived at Peru at 6:56. No. 4 left Peru about 7. This covered the five minutes.

Conductor Clark, of No. 4, is extra passenger conductor, and has been a conductor 12 years. He testified: I arrived at Turkey River at 6:06, one minute late. I there received order No. 5 at 6:08, gave one copy to Engineer Fales, and we left four minutes late. We arrived at Specht's Ferry at 6:41, four minutes late, made our regular stop, and left at 6:42. As I was pulling out I was standing on the steps of the head car; the operator said to me, "No. 3 is running in two sections." I replied, "That makes no difference to me if you have no orders for us." It struck me at that moment that they could not run two sections against me as I had no orders to meet two sections. I had been directed by the chief train dispatcher of this division, M. M. Fowler, that when an order like that had been given that the ruling train would have a right to go ahead after the first section had arrived, after waiting five minutes for a variation in watches, under Rule 44. This was at an examination at Lacrosse in August last. We were not all examined at once, and this statement of the dispatcher was not made during my examination, but was told me by others who had been examined. We arrived at Peru at 6:53, two minutes late. When we stopped I got off and walked up to the engineer and said, "Fales, there is a chance for an argument on these orders." He said, "Why?" I replied, "The operator at Specht's Ferry told me that No. 3 is running in two sections." Fales said, "That don't make any difference to us, as second section can't get here unless they come coupled together, or the first section brings us orders." I got up on the engine and said, "We will read the rules on the back of the card." We read Rule 45. Fales said, "The first section by time-table rights cannot get here until 6:51. Our orders will let first section come here, but second section cannot get here on time-table rights. After first section gets here, we will go." And I said, "We will go as we have a right to go." The fireman, William Richmond, heard the entire conversation, and said that "if Winchester (the engineer of 2d sec. of 3) gets the same orders we have, he won't come against us." Winchester was regarded by us all as good authority on time card. After exchanging identifications with No. 3, we pulled out at 7 o'clock even. I looked at my watch to see if the five minutes for variation of watches had expired.

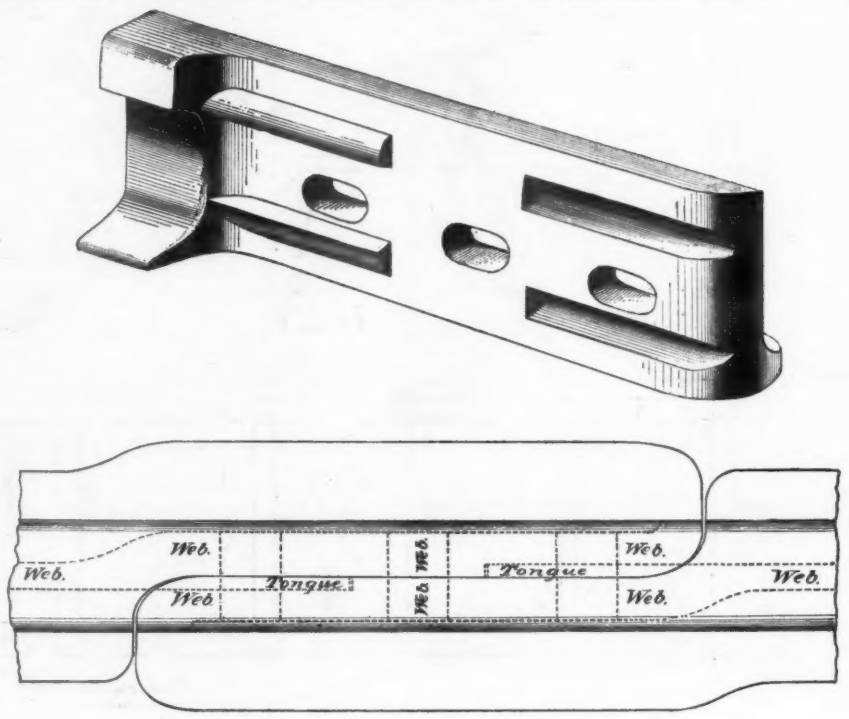
Assistant Train Dispatcher James P. Rogers identified all the orders heretofore referred to. He stated that he told the operator at Specht's Ferry, the first telegraph station north of Dubuque, to tell the conductor of No. 4 that No. 3 was in two sections; that afterward he concluded to issue a regular order to that effect, and called the operator at Specht's Ferry but failed to get him. When he finally got him No. 4 had passed. Mr. A. Ott, agent at Specht's Ferry, says that he received instructions from Dispatcher Rogers to tell conductor of No. 4 that there were two sections of No. 3; that he took it down on a slip of paper that he might not forget it, and kept the paper in his hand until No. 4 had arrived, and that he told Conductor Clark. "Clark made no reply."

The report then goes into some speculations about the meaning of the rules, and continues:

The testimony taken shows that the conductors and engineers of both Nos. 3 and 4 were men of many years' experience, and regarded as careful and reliable. The train dispatcher, Rogers, had had, however, but two years' experience in that capacity, although he had served as operator for six years. After dividing No. 3 into two sections and ordering them both to meet No. 4 at Peru, he should have issued a new order to No. 4 at Specht's Ferry to meet first and second sections of No. 3 at Peru. He must have constituted the first section of No. 3 before No. 4 reached Specht's Ferry, or had it in his mind so to do, otherwise he would not have told the operator at that place to tell No. 4 that "No. 3 was in two sections." If, however, the order creating the first section of No. 3 was given after No. 4 left the last telegraph station, the blame that attaches to the dispatcher is in no manner mitigated, as he should not in any case change the conditions and circumstances of meeting trains after the time has gone by when he can advise all trains or sections of trains in any manner interested.

The following expert testimony was elicited:

Supt. W. J. Underwood was asked: "Upon whom and where do you place the responsibilty of this collision?" Answer.—"I place it first on the dispatcher for giving an indefinite and wrong order. Second, on the conductor and engineer of No. 4 for not obeying the order given, or at least not regarding the doubt which is provided for in the rules. In giving an order for a train of 2 sections, the order should have read: 'Meet the 1st and 2d sections of No. 3.'"



THE SPLICED-RAIL JOINT

Train Dispatcher Rogers was of the opinion that "each section of a train is not a train, but the orders should be issued to both sections. I consider both sections of No. 3 to be one train, and first section part of the train, and that No. 4 should wait for all sections for which signals were carried. A dispatcher should communicate with all sections of a train separately, but the opposing train should not necessarily have notice that there were two or more sections under Rule 104."

Several old conductors and enginemen gave opinions, some of them not very clear. One of them would not have started No. 4 from Peru, as No. 3 was not complete until all its sections arrived; but he adds that "Usually orders specify what sections are to be met." The report continues:

There appears to be no question under the rules that when No. 3 and 4 were ordered by the train dispatcher by special telegraph order to meet at Peru, that they both became trains running under telegraph orders, and that all time-card rights and track rights, so far as each other was concerned, were suspended until the dispatcher's order had been complied with and they had met at Peru. The mooted question is whether under the rules No. 4 ceased to be running under orders and had its time-table rights and right of track restored after meeting the first section of No. 3 at Peru. * * *

The report then goes on to show that the natural construction of Rule 104 affords considerable justification for the action of the conductor of train 4, and concludes as follows:

A modification of Rule 104 so as to read, "In moving trains by special orders, each section shall be taken and considered as separate and distinct, and shall receive and run only under special orders addressed to its own conductor and engineer, but the different sections shall together constitute but one train," would remove the ambiguity and conflict with form "E." If however the conductor of No. 4, while discussing the meaning of the rules on the cab of the engine had kept in mind the clause "*In all cases of doubt take the safe side*," the accident would have been averted; although the fact of the conductor and engineer of No. 4 starting their train and running it at the high rate of speed at which it was running when it struck would indicate that there was no doubt in their minds of their right to go. It would seem that the rules might be further modified so as to provide that no change should be made in the meeting of trains or sections of trains without giving notice to all trains or sections of trains that may be affected by the change, and that no changes whatever should be made after all trains interested had passed beyond the reach of the dispatcher. Rules regulating the running of trains should be definite and certain, and if possible should be so framed as to admit of but one interpretation.

The report is signed by the full board, Messrs. Dey, Coffin and Smith.

The local newspapers gave the following copy of an affidavit which a number of conductors and enginemen swore to before the coroner's jury:

I, W. A. Cutting, conductor on the Dubuque Division of the Chicago, Milwaukee & St. Paul Railway, on oath say: That I am thoroughly familiar with the rules and regulations of time card No. 30 of the Dubuque Division of the Chicago, Milwaukee & St. Paul Railway, and have seen order that Conductor Clark had on the 19th day of September, 1887, "Nos. 3 and 4 will meet at Peru;" that with said order, had I been in charge of said train, I would have proceeded as Conductor Clark did, and from my knowledge of the rules above referred to I say that Conductor Clark was justified in proceeding as he did; and further state while being examined as to my understanding the rules above referred to by M. M. Fowler, Chief Dispatcher of the Dubuque Division of said road, on or about Aug. 11, 1887, I asked the said M. M. Fowler the following questions: "If I was on train No. 10, having the right of road, and received an order to meet No. 7 going in the opposite direction, and being a train of the same class at Eckert's, and find No. 7 carrying red signals, would I be required to wait for following sections longer than the five minutes required by time-card rules?" and in answer to said question Fowler stated that I would have the right to proceed, after waiting the five minutes, against the following section.

Later it was said that these men were called to headquarters and their signatures to the following statement obtained:

SEPT. 28, 1887.

W. J. UNDERWOOD, Esq.:

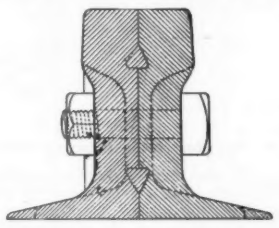
DEAR SIR: After a more careful perusal of the rules on the back of the time-table, I find that my statement to the coroner's jury at Dubuque, relative to the accident between Dubuque and Peru, was erroneous. I have since come to the conclusion that conductor Clark and engineer Fales disobeyed Rule No. 4, which says in all cases of doubt take the safe course. Under the circumstances, I would not have left Peru, except under the protection of flags, and *under the rules Train No. 4 was not justified in leaving Peru as it did.*

The Spliced-Rail Joint.

The accompanying illustrations represent a joint made under the Lightfoot patents. The ends of the rails are formed under dies, and made to fit and interlock with one another, rendering splice bars unnecessary.

The form of the joint will be best understood by reference to the illustrations. Two tongues on one rail fit into two corresponding grooves on the other rail. The three bolts hold the rails together laterally, and the tongues and grooves transfer any vertical movement from one rail to the other.

It is claimed that this joint gives an exceptionally smooth riding track, as there are no projecting rail ends against



which the wheels can strike. This would, of course, imply a large reduction of wear and tear both for rails and rolling stock. It will be noticed that at the splice each half of the rail has virtually the full cross sectional area of a rail, and it is therefore believed that the joint will be of ample strength.

It is stated that this joint has been in use with good results under heavy main line traffic near Pittsburgh, where some 30 joints have been used for ten months on a sharp curve.

The joint as shown in the engravings is about 15 in. long. Smaller joints, 12 in. long, with only two bolts, have been made, but are not recommended for main line use.

Any further information can be obtained by addressing the Spliced-Rail Joint Co., Pittsburgh, Pa.

Steam Heating on a Local Road.

A simple system of continuous steam heating is being used on the Boston, Revere Beach & Lynn. The system was devised by the officers of the road, and is in use on all their equipment used during the winter, 10 locomotives and 23 cars. The road is wholly devoted to passenger business.

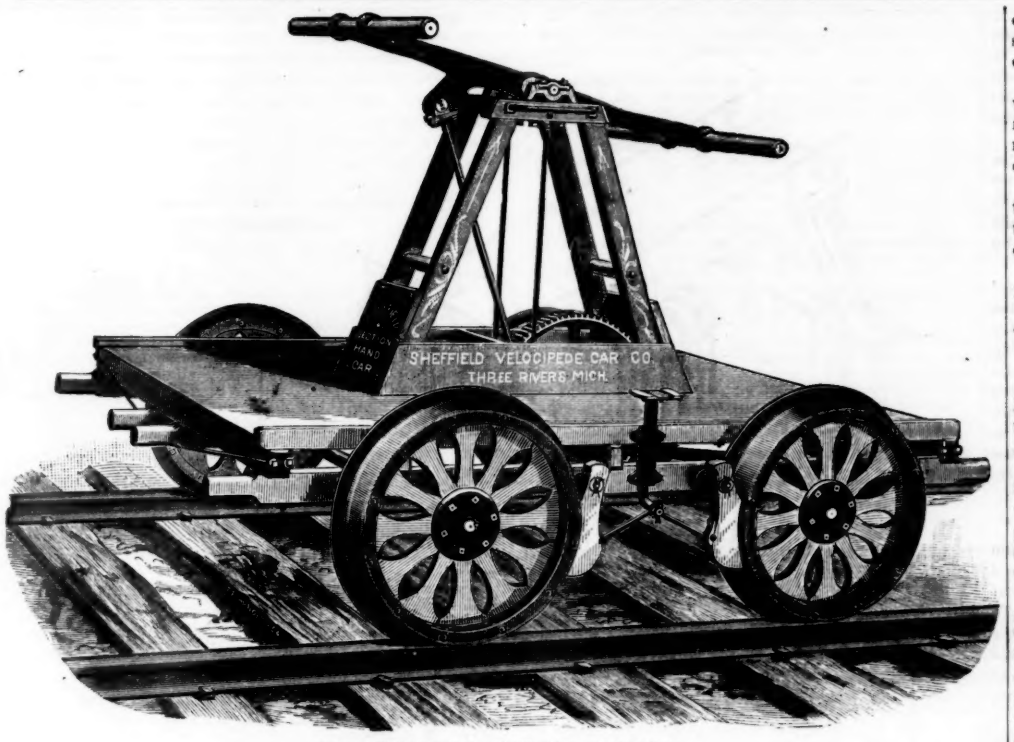
Experience with this method of heating has shown that a simple method of direct steam heating is preferable for safety, efficiency and economy to the methods formerly in use, the Chilson car stove and the Baker heater.

The following is a brief description of the apparatus:

The main steam-pipe, 1½ in. diameter, starts from the dome of the locomotive and passes down below the tender-frame, and thence to a branch pipe at the rear of the tender, having a male coupling on right hand side, and a female coupling on the left hand side of the tender, with a stop-cock on each pipe, so that steam can be turned on or shut off at either coupling as may be required.

A regulating valve, operated from the cab, is placed on the main pipe, with a pressure-gauge near it, so that steam can be let on and adjusted to any pressure—not exceeding 10 lbs. A small "pop" safety valve below the regulating valve is placed outside of cab and prevents the pressure in the main steam-pipe exceeding the limit, 6–10 lbs., to which the valve is set.

The main steam-pipe, 1½ in. diameter, protected by non conducting covering, is carried along underneath each car the entire length on one side and is inclined both ways toward the centre of car. A goose-neck is placed at each end of the main pipe, to which the connecting hose with couplings is attached. At the lowest point of the main steam-pipe at the



THE SHEFFIELD SECTION HAND-CAR.

centre of the car, a "cross" fitting (with plug in bottom for drawing off condensation water should it ever be found necessary) is placed, from which the 1 in. rising branches (one for each side of the car) lead, passing into the car with a valve on each, directly under the centre seat on each side of the aisle, and connecting with top pipe of the radiator. The radiator is simply a 2-in. pipe running along each truss-plank from the centre of the car to each end, and thence returning on a regular grade to the drip-pipes in the centre of the car, which pass through the floor on each side and connect underneath with the steam trap.

On each car there are two stop-cocks in the main steam-pipe (which can be turned by special wrenches), one cock at each end of the car just back of the steps. The cock on the extreme rear end of the train is kept closed during the day and is left open at night. Wrenches for turning these cocks are carried in each locomotive cab, and in the baggage-master's closet in each smoking-car.

The couplings (male on west end and female on east end of each car) are easily brought together by hand. When a car or locomotive is cut off, the couplings part automatically; they can also be separated by hand between cars, or, should they be too hot to handle, they can readily be parted by the pressure of the foot.

The method of working is as follows:

At night when the train is put up or has to stand over one hour all steam couplings between cars are disconnected, and all cocks in main steam pipes are left open, both on locomotives and cars. The steam supply valves inside of each car are also to be left open. To heat up the train in the morning, or after a lay-off, the locomotive is attached to the train half or three-quarters of an hour before train time; all couplings to the locomotive and between cars are connected, leaving the rear cock on main steam-pipe open on the last car. The engineer then closes the cock for the tender coupling that is not to be used on that trip, leaving the other cock open, reversing the process at the next terminal station, and, as soon as all car-couplings are made, he opens his regulating valve about one-eighth of a turn, more or less, according to the state of the weather,—first sending his fireman with wrench and bucket to the tail end of the train to shut the rear train cock as soon as the water has passed off and the steam begins to follow. The engineer allows the steam to blow freely through the pipes until the rear train cock is closed, and then sets his regulating or reducing valve to the pressure required, generally about 3 or 5 lbs.

In very cold weather, should steam be needed in spare cars or in trains laid off a part of the day, at either terminal station, the locomotive of the trains then running (or a spare engine, if at hand) is coupled on to the cars and blows steam through the pipes for such length of time as it can be spared, the same as when heating up in the morning. After the engine has been taken off, all cocks are left open and hose couplings disconnected. The heat remaining in the pipes after the locomotive is detached will usually suffice to keep cars moderately warm for about one hour.

The amount of steam necessary to keep the cars at a comfortable temperature, 70° deg., is chiefly regulated by the engineer using his regulating valve. It can be further controlled by the steam admission-valves under the centre seats in the cars, which can be adjusted by the conductor or baggage-master, if necessary. The valves are left open when cars are put up for the night and during "lay-offs."

The Sheffield Section Hand-Car.

The accompanying illustration represents the standard section hand-car manufactured by the Sheffield Velocipede Co., of Three Rivers, Mich.

It is considerably lighter than the old style of section hand-car, which weighed 750 lbs., while that shown weighs only 425 lbs. This saving in weight has been accomplished by the use of better material and improvements in design. Wrought steel has been substituted for wrought iron, wrought iron for cast iron, and wooden centre wheels with wrought-steel tire for cast-iron wheels.

The car shown in the illustration is made of the following materials:

Frame work of selected ash, axles of H P steel, crank shaft of wrought steel, walking beam of wrought iron, brass boxes for axles and connecting rods, babbitt boxes for crank shaft, gears of cast iron, all workmanship of the best, details being carefully looked after and the whole work carefully supervised and inspected.

It is claimed that the wheels are not only very light and strong but are specially durable. The parts of this wheel are, hub of iron, plate and felloes of wood, rim of wrought steel. The iron hub is a shell with a flange on one end, and in connection therewith is an iron flange which slips over the smaller portion of the hub. Between these two flanges, with ends resting upon the shell, are placed wooden plates, twelve in number, 1⅛ in. thick, which by a machine are pressed down on the hub, and while thus held, they are bolted through the flanges and plates by six bolts. Upon each side of this plate are then glued wooden felloes of proper thickness, and after being turned to the proper size, there is pressed over it by a heavy screw press the steel rim and flange above described, which also has a flange extending down on the outer side of felloe, which is bolted through and through by bolts passing through each felloe and plate. By this depending flange, in connection with the flange to hub of proper size, all danger of "dishing" the wheel is obviated. Each operation tends to drive the plates down upon the iron shell, and being endways of the timber and pressed between the iron shell below and the steel rim above, there is no chance of the parts working loose.

The standard section car has platform 6 ft. long, 20 in. wheels, 3 ft. wheel base, and weighs 425 lbs.

International Railroad Congress—Milan Session.

In previous issues we have given some notes of the action of this Congress so far as reports have been received. From European exchanges now at hand we gather the following additional facts:

On the question of the best lubricant and axle-box for locomotives it was decided to recommend a mixture of vegetable and mineral oil, with due consideration for climatic influence and white metal for axle bearings.

The conclusion was reached that enriched gas was preferable for illumination to napthaline, and that the difficulties in the way of electric lighting for trains were still very great, and the subject of lighting was continued till the next Congress. Concerning methods of heating also it was decided that the question had not yet been satisfactorily solved, and that movable foot-warmers were still the best.

The report of Mr. Solacroup, upon premiums to employés, of which we have heretofore given an abstract, was considered and the Congress recommended fixed and sufficiently remunerative wages, with premiums for economy, provided they the do not interfere with safety and regularity.

Training schools for employés were recommended and one member spoke very decidedly in favor of employing women, and pointed out that deficient muscular strength could be provided for by machinery, in certain positions, as, for instance, by working points and signals by hydraulic apparatus. It was recommended also that higher wages should be paid.

On the question of running engines with a view to getting the most work out of the locomotive and the best distribution of work for enginemen, it was recommended that engines should be taken out by enginemen according to turn, instead of a special engineer being appointed to each locomotive.

The use of continuous brakes on international freight trains was considered impossible, on account of the diversity in the rolling stock, and improvements in the couplings were recommended for passenger cars. The discussion of the question of compounding was put over to the next Congress.

On matters of permanent way the Congress recommended the use of good ballast, frequently renewed, sleepers larger than those ordinarily employed, and strong fish-plates, with constant and minute inspection.

Paris was selected for the third Congress, to be held in 1889.

The Replacing of the Towers of the Niagara Suspension Bridge.

At the meeting of the American Society of Civil Engineers, Nov. 2, Mr. Buck read a paper on renewal of the towers and the transferring of the cables of the Niagara Suspension Bridge. An abstract follows.

Mr. Buck said in effect that the towers started from heavy bases of rock-faced asblar, which bases, two on each landing, were connected by an arch under which the wagon road passed. At the level of the trusses the towers were commenced with a base of 15 ft. square and were 8 ft. square on top.

The towers on the American side were 90 ft. high from the rock and 80 ft. on the Canadian side, where the rock was higher. The top of each tower was entirely covered by a cast-iron bed plate 2½ in. thick, on the upper surface of which were 3 ribs, parallel to the cables, 2½ in. thick by 7½ high. The two spaces between the ribs were 2 ft. 2 in. wide and truly planed on the bottoms and sides. In each space were 10 cast-iron rollers turned to a 5 in. diameter and 2 ft. 1¾ in. long. On each set of rollers rested a saddle of cast iron 5 ft. long and 2 ft. 1¾ in. wide at the base, planed on the under side, with a U-shaped groove on the upper side in which the cables rested with an easy curve. Nine holes were cored through the saddle from side to side under the groove.

The stone in the towers and bases was limestone, and soon after completion the masonry of the towers showed signs of failure, most pronounced at about one-third their height, which was due to the bending strains from the elongation and contraction of the cables, which gave a movement of the saddles, amounting to 2 in. for temperature, and ⅝ of an inch from live load. Other failures of the masonry were clearly due to weathering. The towers were kept well painted, but the disintegration continued, and Mr. Buck proposed facing the towers with new stone, on the supposition that the masonry in the interior of the tower was sound, which was done in 1883. One tower, faced during the absence of the author in Portland, Oregon, had two serious cracks.

In the mean time motion of the saddles on the rollers had about ceased. All the rollers on the top of one tower only covered an area of 3 ft. 4 in. by 4 ft. 7 in. = 17.18, the maximum weight being about 900 tons, and in 1885 joints of the new masonry had opened, and cracks were forming in it.

Iron towers were recommended, the plans made, and the work let to the Detroit Bridge & Iron Works. Each iron tower is made up of four wrought-iron columns, braced transversely and longitudinally by wrought-iron struts and rods. The columns rest on a limestone pedestal capped with granite. The tops of each pair of columns are connected by a heavy web-plate, secured to each web of each column by angles and rivets. These tops are capped by a wrought-iron plate planed to a level surface. On the caps of the two pairs of columns rest the built up main bed, 9 ft. 2 in. long, 5 ft. 3 in. wide and 3 ft. 8 in. high, weighing about 9½ tons. The whole top surface is planed, and on it are laid, but not fastened, two steel plates, with the long sides parallel to the cables, 2 ft. 2 in. wide, 7 ft. long and ⅞-in. thick, with sides and edges planed parallel. On top of this plate are eighteen 4 in. steel rollers, of the same length as the width of the plate, the ends of each roller having trunnions entering into holes in the side pieces of the roller frames, which side pieces are planed so as to fit closely to the ends of the rollers and the edges of the steel plates. A cast-iron bed 7 ft. long, 2 ft. 4 in. wide and 18 in. high, with top and bottom surfaces planed parallel and the bottom re-enforced with a planed steel plate rests on the rollers. The old saddle rests on this. The arrangement is intended to keep out water and as far as possible dust, the old rollers having been badly rusted. The transverse bracing was put in immediately, but as the longitudinal bracing could not be put in till the masonry was removed the iron work was clamped to the stone towers.

The transferring apparatus consisted of 4 cast-iron columns, 2 transverse and 2 longitudinal girders, six 125-ton jacks, wrought-iron shim plates and No. 8 steel wire. The cast-iron columns were set upon the caps, so as to allow the large bed plate to pass between them, the ends of the transverse girders resting on each pair of columns, the two longitudinal girders which rested on them being placed directly over and parallel to each saddle. The saddles were then lashed through the core holes to the bent beams shown in the cut, by steel wire. Three jacks were set under each transverse girder and the new bed plate hoisted and temporarily supported close under the cables.

The six jacks were worked by two men each, and the transverse girders with the load of cables, etc., resting on them were lifted and shimmed up on the cast-iron columns. The old bed plate was then hauled up to the lifting or longitudinal girders, and 3 courses of masonry removed, and the new bed plate put in position and bolted to the caps; the old bed plate was then lowered and moved on to the supports vacated by the new bed. The steel plates, rollers and sad-

dle beds were then placed in position, the jacks again set up, and the pressure taken off the shims, so that they could be removed and the old saddles settled on their beds. Experience showed that it would have been better if all the jacks had been connected together and worked from an accumulator.

After the preparations for a transfer were completed, the time necessary for making the change, including the removal of the 3 courses of masonry, and the old bed plate, was 8½ hours; no trains being allowed on the bridge while the transfer was being made. The total weight raised by the 6 jacks was about 650 tons.

When the second transfer was made the thermometer stood at + 7° F. On lifting the saddles from the rollers, the top of the tower suddenly sprang ⅝ of an inch toward the river. As the two Canada towers were found to be leaning toward each other, an effort was made to spread them, and an application of about 60 tons increased the distance between them only ⅝ of an inch, which shows that the bending strain was much greater than 60 tons As the masonry, particularly toward the top of the towers, was much shattered, the author thinks that any successful attempt to keep the towers from bending would have resulted in their prompt destruction by grinding off their tops.

DISCUSSION.

Mr. Cooper remarked that there was hardly any discussion to be made upon the paper. Mr. Buck had so well described the work as to make it appear a very simple thing, so that we hardly realize the responsible work that he has done. "To think of taking a bridge of 840 ft. span and removing the supports upon which it stands and inserting new ones! We ought to feel a little pride that we have a man among us who can do a work of this kind, and at the same time keep so infernally modest about it."

Mr. Cooper referred to the fact that a short time ago the papers were publishing as a wonderful feat of engineering the sliding of a railroad bridge about 10 ft., which was as nothing at all compared to Mr. Buck's work, which probably nobody outside of the engineering profession knew about. "Why is it that such a work is hardly spoken of and that some little petty thing is heralded far and wide? It is because we are all so modest. I am willing to divide with you, Mr. President, my share of that modesty."

Mr. Worthen remarked that the society fully appreciated what Mr. Buck had done and the value of the description he had given in his paper.

The Exhaust Injector.

The following explanation of the action of an exhaust injector appears in the columns of the *American Machinist* and will be new to many of our readers.

The subject will be best understood by taking an actual case and analyzing theoretically the action that takes place in an exhaust injector forcing water into a boiler. The exhaust steam may be taken at atmospheric pressure, and the boiler pressure at 70 lbs. per square inch above the atmosphere, and the temperature of the feed water may be assumed at 70 deg. Fahr.

The steam temperature corresponding to atmospheric pressure is, of course, 212° Fahr.; and we know by practical experience that we can feed water into a boiler at 190° Fahr. We will therefore take 190° as the feed temperature; that is to say, the rise in temperature of the water is 190° — 70°, or 120° Fahr. Looking upon the injector as a heat engine, by the laws of thermo-dynamics we should have an efficiency of

$$\frac{t_1 - t_2}{t + 461.2}$$

or

$$\frac{212 - 190}{212 + 461.2} = \frac{220}{6732} \text{ or } 0.0327$$

but little over 3 per cent. of the total work in the steam used; but we will not follow out this method of reasoning, but confine ourselves to a plainer statement of the action of the instrument, which can be understood by any who can use the first three rules of arithmetic.

Experiment has shown that steam will flow into a vacuum or into a partial vacuum with a velocity dependent upon the difference between the pressures of the vessels between which the flow takes place. In the exhaust injector we have first steam at 212°, which has a pressure of 14.7 lbs. per square inch, or say 30 in. of mercury. We next have the vessel into which the steam flows. Clearly this is the combining nozzle of the injector at a temperature of 190°, equivalent to 19 in. of mercury. We will call these two pressures P and p respectively. The density of mercury as compared with water is 13.6. This we will call D. The density of steam at 212° is similarly .00060826, and this we will call d. Now, careful experiment and reasoning has shown that the rate of flow in feet per second with which steam will pass between two vessels may be expressed by the formula

$$V = \sqrt{\frac{64.4\,[P - p]\,D}{12\,d}}$$

or more simply

$$V = 29.6\sqrt{\frac{P - p}{12\,d}}$$

For our particular case, knowing d P and p, we have simply

$$V = 1200\sqrt{\frac{P - p}{12}}$$

or 1200 × .957 = 1148.4 ft. per second. This is to say that if a partial vacuum equal to 11 in. of mercury exist in one vessel, steam will rush into it at the speed of 1,148 ft. per second from a simple open-topped boiler. This velocity is very great, being nearly 800 miles per hour. Here, then, we have our working factor—a jet of steam, traveling at 1,148 ft. per second. This jet becomes condensed by contact with the feed-water, and is so reduced to very small bulk, but still preserves its great velocity. It has now to perform work, having attained this high velocity by a change of temperature; that is, by losing 22 degrees in temperature, it has acquired another kind of energy—the energy of motion—and this it is that must now be utilized to perform work. If we turn to works on hydraulics, we may find that, similarly, to make this investigation short, water issues from an orifice, with a velocity in feet per second =

$$V = 12.19\sqrt{P}$$

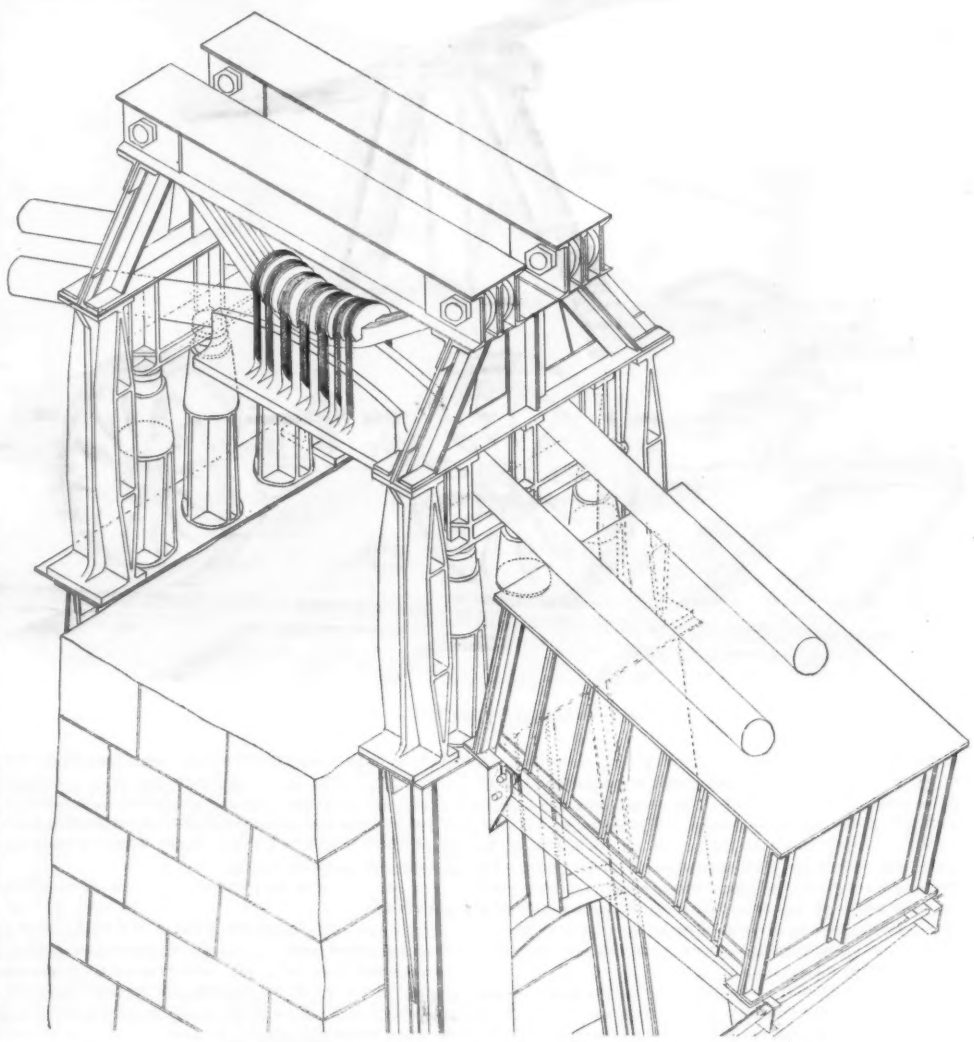
where P is the pressure in pounds per square inch, within the vessel from which the flow takes place. We will suppose that the boiler pressure in our present case is 70 lbs. by the gauge, so that the total difference of pressure between the boiler and the combining cone of the injector is 75 lbs. Thus $V = 12.19 \times 8.66 = 105.5$ ft. per second, against which the injector has to work. In other words, there is an opening in the boiler out of which water is rushing with a speed of 105½ ft. per second: and we require to overcome this jet by means of another jet, which must clearly have a velocity greater than 105½ ft., or it will not drive back the issuing jet. It has been stated that, of the water entering a boiler, one-eighth, when forced in by the exhaust injector, consists of the condensed exhaust steam, the remaining seven-eighths being water. This being the case, let us admit, and we have a jet of steam at 1,148 ft. speed, carrying with it seven times its weight in water. Under these circumstances we should expect that the combined jets would only have one-eighth the velocity of the steam, for the water supply flows simply slowly into the instrument. One-eighth of 1,148 is 143½, and this is the final jet velocity, whose duty it is to overcome the outflow from the boiler at 105½ ft. Let us allow 25 per cent. for loss by eddies and friction in the nozzles, and we are still left with a velocity of 107½ ft. to combat a jet of 105½. Clearly the injector is the better, and will feed our boiler at 70 lbs. gauge pressure with ease under the conditions laid down; and with this view of its action it is not difficult to comprehend its working. Let us now see if the proportion of steam of one-eighth is compatible with known facts.

We have 7 lbs. of water, raised from 70° to 190°. This will require 120 × 7 = 840 thermal units. [More truly, 844 units.]

One lb. of steam at 212° contains 1,178.6 thermal units. The same at 190°, *i. e.*, when reduced to water, contains 190.6. In thus changing to water our pound of steam has given up 1,178.6 — 190.6 = 988 thermal units, but we have only absorbed 844 by our 7 lbs. of water. We are therefore driven to conclude that some item in our assumptions needs changing. First, if the proportions of steam and water be unchanged we should require a colder feed. With a feed supply of 60°, for example, we should absorb heat to the extent of 130 × 7 = 910. With 50° temperature we should absorb 980 units, and so may conclude that in this case we should need colder water to fulfill the other conditions. Secondly, we might put in our feed at more than 190°. If at 200° our 7 lbs. of water would absorb 130° × 7 = 910 units, and our pound of steam would give up 978 units; at 205° the water would absorb 945 units and the steam would give up 973 units; but at 205° the rapidity of steam flow would be much reduced, being only 600 ft. per second by the formula given above; so we may conclude that the injector would not work in this second case at all.

Finally we may suppose the amount of steam consumed to be only one-ninth of the total jet, and we have then 1 lb. of steam, losing 988 units and 9 lbs. of water, gaining 120 × 8 = 960 units. Here we have a very close correspondence, and as we have a final jet velocity of 1148 ÷ 9 = 127 ft. per second, or still a large margin for frictional resistance we may conclude that with water supply a little under 70° and a final temperature of 190°, we could feed readily into a boiler at a gauge pressure of 70 lbs., and consume exhaust steam to the extent of 1 lb. for every 9 lbs. of feed.

With colder water supply of course we may expect the best results: but a few simple figures have here served to show that the exhaust injector is a remarkably efficient machine under its conditions of working, and may be expected to perform just about what our figures show to be its practical limits, and which experience has proved are such.



TRANSFERRING APPARATUS—NIAGARA BRIDGE CABLES.

A Dredger for the Suez Canal.

The Suez Canal Co. have contracted for a large marine dredger, which has just been launched at the shipbuilding yard of Messrs. Lobnitz & Co. The dredger is intended to excavate about three million tons of very hard rock in the bed of the proposed enlargement of the Suez Canal. As described by *Iron*, the dimensions are: Length, 180 ft.; breadth, 40 ft.; depth, 12 ft. The total machinery on board amounts to 1,000 indicated H. P. The dredging mechanism, which is capable of dredging in from 10 to 40 ft. depths of water, is of the continuous bucket order, and is fitted with Lobnitz's guide and pitch wheels driving gear.

In addition to the dredging machinery, the boat is fitted with 10 rock cutters or chisels, weighing four tons each and 45 feet in length. These are to be actuated by six-ton hydraulic hoists, capable of lifting 60 ft., the whole rock-breaking apparatus to be manœuvred by one man.

These chisels have been adopted after various dry land trials on some of the hardest rocks to be met with in Scotland on the following basis: "The cost of excavating and removing rock by the blasting system, when working at, say 30 ft. under water, may be stated at 20s. ($4.88) per cubic yard. With the new system, of which the *Dérocheu e* is the pioneer representative, 4s. per cubic yard will easily cover the cost of breaking the rock and raising and carrying away the débris. Various trials, which were carried out from March to June of this year, at Craigmillar quarry, Edinburgh, under the personal supervision of engineers from the Suez and Panama Canal companies, and Scotch and French engineers, have given most satisfactory results. At the last of these experimental trials the results showed an average of over 6 cubic feet of rock dislodged for each blow of a cutter weighing less than two tons. Similar results were attained at the other trials. The lowest average result was about 4 cubic feet per blow of this light cutter."

Four and a half to five dollars is doubtless a fair estimate for blasted and dredged rock under 30 ft. of water. It at least is not too high, if no allowance is made for excavation below grade. But we doubt about 4s. (78 cents) easily breaking rock by chisels. This dredge, the Dérocheuse, happens not to be the pioneer representative of chisel boats. Before the days of high explosives and waterproof fuse, nearly all isolated rocks in our waters were attacked by chisels, and notwithstanding the rather prohibitory cost of such proceedings the United States engineers rigged up a chisel boat for use on the Rock Island Rapids, where a 4-ft. low water channel was opened through a "limestone of minor hardness." The chisels weighed between 3 and 4 tons each and delivered, on an average, 60 blows per cubic yard excavated.

While these boats did not usually work in only 4 ft. of water, they, on the other hand, never worked in 30 feet of water, and the cost per cubic yard was from $16 to $18.

If the Suez Canal people want to get that rock taken out

with economy, they had better, leaving the Dérocheuse where she is, come over here and get a contractor who is used to under water rock excavation. His entire outfit would consist of some steam drills, a few extra long rails for tripods, some timber for platforms and a backsmith shop, with a tug to furnish steam to the drills. Any good dredge will pick up the rock. The entire plant after completion of the work at the Suez Canal would be servicable in like work elsewhere, or could be applied to entirely different purposes.

TECHNICAL.

The Car Shops.

The Chicago & Alton has lately built two fine passenger coaches fitted with the Forney seat, and provided with smoking room. The cars are mounted on six-wheeled trucks, with 42 in. Allen paper wheels, and measure 64 ft. 7 in. over bodies and 73 ft. 6 in. over all. Four handsome chair cars recently finished weigh 82,000 lbs. each, and measure 61 ft. 2 in. over bodies. Two similar, but smaller, chair cars are also under construction. This road has also lately added to its equipment 219 50,000-lb. coal cars, each 34 ft. long, and 225 stock cars, each 35 ft. long. All these cars were built at the railroad shops at Bloomington.

The Morris Car Co. has been incorporated in Chicago with a capital stock of $150,000. The object is to buy, sell and lease cars of all kinds; incorporators, Edward Morris, Alexander Gilkison and H. M. Wolf.

The Northwestern Manufacturing & Car Co., of Stillwater, Mich., was sold last week to the Minnesata Thrasher Co., for $1,105,000.

Bridge Notes.

The Union Bridge Co., of New York, has been awarded the contract to construct a bridge over the Ohio River at Newport, Ky. Cost, $1,500,000.

The county commissioners will build a bridge at Eau Claire, Wis. Cost, $25,000.

The Central of Georgia will build a bridge at Atlanta.

The county commissioners will build a bridge at Manchester, Mo.

The county commissioners will build a bridge across the Kaw River at Armourdale, Kan. Cost, $75,000.

The commissioners will build a bridge across the Black River at Watertown, N. Y.

The commissioners of Green Bay, Wis., will build a bridge. Cost, $20,000.

The county commissioners will build a bridge at Falling Water, Tenn.

Manufacturing and Business.

The Wooley Electric Motor Co., of Chicago, has been incorporated with a capital stock of $100,000. The object is he manufacture of magneto-electrical engines. Incorporators: Clair D. Vallette, Albert N. Eastman and Edward E. Gray. The Brookline Electric Motor and Lighting Co., of Chicago, has been incorporated, capital stock, $100,000. The object is to furnish electrical power, electric light, etc.; incorporators: William A. Stiles, James McGlaughlin and John R. Hollister.

The Wainright Manufacturing Co., of Boston, reports the following shipments of their feed-water heaters during the month of October: 2 in Boston, and one each in the following places: Somerville and No. Billerica, Mass.; Freeport, Presque Isle and Cumberland Mills, Me.; Montpelier and Burlington, Vt.; Phillipsburg and Dublin, Pa.; Davenport, Iowa; Augusta, Ga.; Yarmouthville, Nova Scotia; Montreal, P. Q., and Yokohama, Japan. At a special meeting of the stockholders of the company, held on Oct. 26, the following officers were elected: Jere Abbott, President; John A. Loring, Vice-President. Percival L. Everett, Treasurer; C. D. Wainright, General Manager; James M. Betton, Secretary. Directors: Jere. Abbott, John A. Loring, Percival L. L. Everett, Chas. S. Dana, Gideon Scull, Wm. B. Bacon and C. D. Wainwright.

The Dunham Manufacturing Co., of Boston, manufacturers of the storm and spark proof car door, report shipments during the past ten days to the following companies: Mobile & Ohio, Chicago & Grand Trunk, Cleveland, Columbus, Cincinnati & Indianapolis, New York Central & Hudson River, Fitchburg, Connecticut River, Providence & Worcester, Lehigh Valley, Intercolonial, St. Charles Car Co., Litchfield Car Co. and United States Rolling Stock Co. C. F. Quincy is Treasurer of the company.

The National Electric Construction Co. has been incorporated in Chicago; incorporators, J. E. Tuttle, Frank A. Wunder and Olive G. Fessenden.

The Dickson Manufacturing Co., of Scranton, Pa., has the contract for two switching engines for the Brooklyn Bridge, to weigh 44,000 lbs. and cost $5,500 each.

The Decatur Car Wheel and Spring Co. has been organized in Decatur, Ala., with E. Stanley Mitchell, of Milwaukee, President; R. M. McCullough, Secretary and Treasurer, and Ed. P. Tippett, Vice-President. The company has let the contract for the erection of its building to L. B. Wheeler, of Atlanta, Ga., and it will be put up at once. The shops will have a capacity of manufacturing 100 car wheels a day and a large quantity of car springs.

Bids for iron and steel work for the approach of the Brooklyn Bridge. The New Jersey Steel and Iron Works, 5.57 cents per pound erected; Keystone Bridge Company, 7¾ cents per pound erected. The contract was awarded to the New Jersey Steel and Iron Works.

Bement Miles & Co., machine tool builders, of Philadelphia, are making extensive additions and improvements in their works. They are now erecting a foundry building of brick, 162 × 52 ft., with a four story wing, which will contain two new cupolas, besides boilers and engines, elevator and three core-ovens, the largest 16 ft. wide. The firm have also just completed a three-story building 82 × 46 ft. Over 600 men are now employed.

Iron and Steel.

A battery of six steam boilers in the Lawrence Iron Works, at Ironton, Ohio, exploded on Oct. 24, killing four men and wounding twenty. The west part of the mill is a total wreck.

The name of the $100,000 stock company lately reported as formed to establish chain and architectural iron works at Decatur, Ala., is the Decatur Chain and Architectural Iron Works. The incorporators are: W. H. Wooldridge, of Birmingham; W. W. Barnes, W. W. Littlejohn and H. S. reeman.

Work has been commenced on the foundation of the new rail mill to be erected at Jackson, O. The building is to be 330 × 110 ft., brick walls and metal roof.

Iron River Furnace, of the Iron River Furnace Co., at Iron River, Mich., has resumed operations after a period of idleness, under the management of Mr. R. Hunt.

The Northern Alabama Furnace, Foundry and Land Co. has been organized, with a capital stock of $1,000,000, with the following officers: Dr. J. S. Lawton, Atlanta, Ga., President, and J. H. Field, Columbus, Miss., General Manager. The principal office is to be at Florence, Ala. The company has contracted to build three 150-ton furnaces.

The Nashville Steel, Iron & Charcoal Co. have contracted with the Lawrence Iron Co., of Lawrence County, Tenn., for re for their two furnaces to be built at West Nashville.

A company has been organized at McDonald, Pa., with a capital of $75,000, for the purpose of building a foundry and machine shop to manufacture the Edney coal mining machine.

Carnegie Bros. & Co. have closed a contract with Chalmer, Spence & Co., through the latter's Pittsburgh agent, J. K. McKnight, for 20,000 feet of asbestos covering for the pipes of the new rail mill.

The Continental Steel Car Wheel Co. has been organized at Norristown, Pa., for the manufacture of rolled steel car wheels, under letters patent issued to Col. Theodore W. Bean.

The Westinghouse Electric Co., of Pittsburgh, Pa., has been awarded the contract of lighting the Senate Chamber of the Capitol at Washington. This contract calls for 1,300 electric lights, which will include all candle-power from 9 to 16, 25, 50, 75, 100 and 150. The entire plant will be placed within the building.

The Central Forge Works have incorporated at Flushing, N. Y., with a capital stock of $100,000. W. F. Penkham and others, incorporators.

The Fulton Iron Works of San Francisco were burned last week. Petroleum, which had been used for fuel, caught fire as it was being put into the boiler. The machine shops, with much machinery, including completed castings for six steam schooners, were destroyed. The loss will probably reach $200,000. The California Car Works, adjoining the iron works, also burned. Loss, $50,000.

The Burlington Rolling Mills, Burlington, Ia., which have been closed for over a year, have been rechartered under the name of the Iowa Rolling Mill, with a capital of $70,000, and passed under the control of three capitalists from Youngstown, Ohio. Theo. Guelich is President of the company.

The Union Steel Co., of Chicago, made 19,890 tons of rails during the month of October in 47 turns, or an average of 419 tons per turn This is one of the best, if not the best records of steel rail production known.

The Rail Market.

Steel Rails.—There have been several contradictory reports in circulation during the week concerning large sales. The general dullness of the market has been relieved in this way, if not more substantially. The business is variously reported to aggregate between 16,000 and 22,000 tons. Some mills are said to be willing to take orders on the basis of $32 at Eastern mill. Quotations, $32@$33, according to size of order, time of delivery, etc.

Old Rails.—Market is reported dull. Sales of small lots have been made at $21.50 for tees and $22 for double heads.

Scrap.—Quotations: $20@$20.50, ex-ship, for foreign, and $21@$22 from yard, for domestic.

Track Fastenings.—Quotations: Spikes, 2.25@2.40c.; angle bars, 2.05@2.15c.; bolts and nuts, 3@3.25c.

Heating Passenger Cars in France.

In view of the difficulty of conveying hot water throughout the whole length of a train, the Eastern Railroad of France made the experiment of introducing upon every car an original appliance for heating the water. The experiments made in 1874 resulted so satisfactorily that the contrivance was extended to 50 more cars in 1876 and to 27 more in 1881. In view of the experience thus acquired the company felt itself compelled to make further experiments on the same cars with boilers of improved construction.

The cast iron boiler, with the fire-box attached, is fastened to the car sills about midway on the car. The steam pipe, which has a double envelope and a valve for the regulation of the fire, passes into the air outside the car frame. Two arms branch out from the upper part, which respectively supply the heating pipes of the front and rear compartments, while two other pipes carried the water from the heating pipes back into the lower part of the boiler.

The amount of water kept in circulation varies from 14 to 20 gallons. The whole weighs from 1,450 lbs. on a first-class car to 2,030 lbs. on a third class car. By making use of this mode of heating a temperature of from 55 deg. to 60 deg. Fahr. can be maintained on an average journey, which can be augmented by 35 deg. or 40 deg. Fahr. without danger of extinguishing the fire. There is a cock where the water enters the heating pipes by which the circulation may be stopped.

In the first experiment the boiler and fire-box turned out so much too small as to prevent the desired modulation of the heat, so that a special employé had to be detailed to the supervision of the heating appliance on each train. In time this work will be attended to by men at certain stations. The cost is about 4 cents per hour.

The Panama Canal.

Count de Lesseps has announced to the Academy of Sciences, of France, that the Panama Canal will be opened on Feb. 3, 1890. The work will not then be entirely completed, but the passage will be free for 20 ships a day. It is impossible, without research, to say to what number the series of announcements has reached.

Nicaragua Canal.

The steamer Hondo sails from New York Nov. 26 for Nicaragua with an expedition to complete the final location of the inter-oceanic canal route, and to prepare the work of construction, which is to be commenced during the winter. The expedition consists of 40 engineers and 110 laborers, in charge of Civil Engineer Perry. Chief Engineer A. G. Menocal will join the party in a few weeks.

A Place to Build Railroads.

Engineer Sheets reports to the Bellington Bay & Navigation Co. that the timber along Puget Sound within logging distance by skid roads is nearly exhausted, but there is plenty along the rivers. He thinks that as 75 cents per thousand feet is charged for merely booming the river logs, and as railroads can make a good business in transporting them at one dollar, it will pay to build roads, seeing there are over nine billion feet—mostly Douglass fir, with some red cedar. It is probable, Mr. Sheets thinks, that sevenfold this amount of timber would also be reached by short logging roads that would be built by the lumbermen at their own cost with iron furnished by the company.—*N. Y. Evening Post.*

A New Cable Road in New York.

It is announced that the Third avenue surface road, of New York, has decided to change from horse to cable traction. Three-fourths of the stock was represented at the stockholders' meeting at which the change was decided upon. The estimated cost of the change, including rolling-stock, is $1,500,000. The company will issue $5,000,000 first mortgage five per cent. bonds for this work and for refunding the present debt of $3,500,000.

Navy Bids.

Bids were opened Nov. 1 at the Navy Department for the construction of one first-class steel, twin screw, sea-going torpedo boat, and for three overhead traveling cranes with supports and frames for the Washington Ordnance shops. For the torpedo boats the bidders were the Vulcan Iron Works, of Chicago, at $84,800, and the Herreshoff Manufacturing Co., of Bristol, R. I., at 82,750. For the overhead traveling cranes and appurtenances bids were made in detail for the different parts of the structures by William G. Coolidge & Co., of Chicago; Roberts & Co., of Philadelphia; Yale & Towne Manufacturing Co., of Stamford, Conn.; Post & McCord, New York, and Morgan Engineering Co., of Alliance, O. The lowest bidders in the different classes were Roberts & Co., Morgan Engineering Co., W. G. Coolidge & Co., and the Yale & Towne Manufacturing Co.

Westinghouse v. Carpenter.

The motion by the defendant, Carpenter, to modify the preliminary injunction ordered last week by the U. S. Circuit Court, Des Moine, Ia., in the case of Westinghouse vs. Carpenter, so as to permit the defendant to give bonds instead of being enjoined, and continue using his air-brake coupling and filling contracts for the same, and to prevent the complainant from making public the decision of the court, was overruled to-day, and a writ of injunction ordered to issue. This prevents the use by Carpenter of his coupling pending the suit for a final injunction.

Portable Railroads in Germany.

During the last seven or eight years the adoption of portable railroads for agricultural, mining and other purposes in Germany has considerably increased. The latest official returns show that in 1884 there were in Prussia and the provinces of that country 381 portable railroads, with a total length of 272 miles, and a rolling stock of 6,616 cars. Of the total quantity 69 per cent. were constructed on one or other of the well-known systems now in use, while the remainder had been laid down according to special designs. The systems referred to were those of Decauville (Paris), Oxenstein and Köppel (Berlin), Gebruder Koppe & Co. (Alfeld), Spalding (Pomerania), Hoffman (Berlin), Dr. Müller (Berlin and Inowrazlow), Dolberg (Rostock and Berlin), and Dietrich (Berlin). The Vignoles rail was almost exclusively used, the only exception being the pointed rail of the Hoffmann system. The material was usually iron or steel. The principal employment was for agricultural purposes, the transport of beet for sugar manufacture being an important feature of the use of these railroads, this section alone employing one-third of the entire number in existence in Germany. The motive force was in most cases furnished by workmen or by animals. The gauges were various, there being no less than 57 gradations, from 13 in. to 39 in. The principal gauge was 19.68 in. (.5 metre). There were, moreover, 334 fixed small gauge railroads, with a total length of 363 miles, and a rolling stock of 6,190 cars. Steam power was only used on 31 of these railroads. Agricultural employments only engaged 7½ per cent. of these lines, and industrial uses 8¾ per cent.: a large number being devoted to purposes connected with building. Portable railroads are also largely used by contractors in building or widening standard gauge railroads.

The Clayton Air Compressors in Caisson Work.

In a recent letter from George S. Morison, C. E., to the Clayton Air Compressor Works, of 43 Dey street, New York, he says: "I am still well satisfied with the working of your air compressors, and just now, as you know, have four No. 4 Clayton duplex air compressors in actual work, two at Omaha and two at Rulo."

Mr. Morison has used the Clayton compressor quite extensively in former work, as at the Bismarck bridge and the Blair Crossing bridge. Among other recent work where this compressor has been used are the Aransas River bridge, the new Harlem bridge and the Hudson tunnel.

Euphorbia Rubber.

Up to a comparatively recent date, small parcels of this gum have occasionally appeared on the market, but for some time rubber manufacturers could not succeed in satisfactorily making use of it. At last, however, a method has been discovered which renders the gum available for mixing with various kinds of India rubber to the extent of 50 per cent. A piece of vulcanized rubber containing 50 per cent. of the euphorbia gum has been tested for some time in an exposed position on a roof, and it has kept better than a similarly exposed piece of ordinary pure (vulcanized) rubber. Mixed with gutta-percha, it prevents the latter becoming brittle. Washers made with 30 per cent. of this gum and vulcanized rubber stand well and retain their elasticity. Tubing for carrying high pressures is far less likely to split and crack when a proper quantity of euphorbia gum is employed.

The Railroad School in Buda-Pesth.

Some weeks ago we noted the opening, in Buda Pesth, of a school for the education of railroad employés. Professorships have been established in the following obligatory courses: Railroad technology; telegraphy; handling of freight; commercial service; railroad geography; railroad history; railroad law and management; business arithmetic and railroad law; practical knowledge of freight. German and French are also to be taught, but are not obligatory.

Heating Cars by Electricity.

Experiments are being made in a car-shop in Paris upon the heating of passenger cars by electricity. Messrs. Courcelles and Eler introduce into the present heaters a lattice of lead bars, which are charged with electricity from a dynamo on the locomotive. Their temperature then rises, and according to the inventors they impart their heat to the surrounding envelope. In the experiments a Gramme machine was used, which gave a current of 24 ampères and 50 volts. The current passed through 5 heaters, in size 6 ft. × 10 in. × 2 in., containing in all 45 bars of lead. Theoretically a mechanical force of ⅓ horse-power is required to keep the heaters warm. A train of 7 cars, of 3 compartments each, requires nominally 6, really 10, horse-power. Leaving material and care out of consideration, the cost of this mode of heating is far too high as compared with the present system of using pipes filled with hot water. The latter must be replenished about every two hours at an expense of 15 cents. In the water pipes the temperature falls slowly from about 200 deg. to 105 deg. Fahr. The mean temperature of these extremes can hardly be reached by the electric appliance.

A proposition made by Mr. Tomasi seems more practicable. Instead of filling the pipes with hot water, he proposes filling them with soda lye, or acetate of soda, which has a much greater capacity for heat than water. Then an even temperature can be maintained by means of metallic spirals heated by electricity.

The Siberian Railroad.

The London *Spectator* has an article upon the Russian Pacific Railroad, in which it says the central belt from the Ural Mountains to the Amur Valley is the latest suggested route. If this is adopted the line will pass by the important cities of Omsk and Tomsk, round the northern bend of Lake Baikal, and bending on the east close to the Chinese frontier run down to Vladivostock, which is to become the Sebastopol of the Pacific, and is close to the coveted kingdom of Corea. It is a political project, but there is plenty of freight in the country, furs, minerals and timber, and it now costs a hundred dollars per ton for carriage from Western Siberia to Moscow. But the climate is very bad, and expenses will be enormous.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The full account of the collision on the Chicago, Milwaukee & St. Paul, Sept. 19, which we give on another page, is instructive, and again confirms the fact that nearly every train accident is the result of two or more separate causes. It will be observed that the uniform code was not in use, though the newspapers at the time said it was. The rules are incomplete and ambiguous, the maker of them doubtless depending, as numberless others do, upon the carefulness and skill of those who were to execute them. The dispatcher, on the other hand, depended upon the rules; and each throwing the burden on the other, brought on disaster. It will be observed that there is a disposition in several quarters to fall back on the general rule about taking the safe course when in doubt. While this rule is proper and necessary, it is a shame for an officer to offer it in defense when the doubt arises from the equivocal construction of his own rules; at least until he has made every possible exertion to render the rules unequivocal. The expert testimony is of little value, as those who gave it showed wavering opinions in nearly every case. The uniform code is vindicated in two points; the double order system and the rule specifying that when a train is mentioned all its sections are included. Either one of these provisions would have obviated this collision. It must be a satisfaction to those who are using the new code to feel that every rule, indeed every word in it, has been considered with as much care as have these two points.

A shut-down of oil producers is announced to take effect Nov. 1, and to continue one year. The *Oil City Derrick* publishes the statement as by authority. The project is to cut-off one-half of the production, based on the gauges of the wells during July and August. The Producers' Protective Association, which takes this action, is said to control absolutely the entire field, excepting the "Saxonsburg" territory, and this they expect to control, to some extent at least. Aside from the other bearings of this action, it has an interest from its relation to the problem of petroleum burning on locomotives. We have shown before that there was little chance of using petroleum successfully for fuel, under present conditions. While mechanically it is not only possible, but even brilliantly successful, economically its use on locomotives in this country can be but limited. The production was lately estimated as at the rate of 31 million barrels per annum, equal for locomotive firing to 10 million tons of coal. But the Pennsylvania's system alone burns over one-fourth of that amount of coal. Or, to put it in another way, estimating the train mileage of the country for this year at 600 millions (it was 570 millions in 1886) and the coal consumption at 25 miles to the ton the locomotive consumption would be 24 million tons—equivalent to a good deal more than twice the annual production of petroleum, when production is normal. Now if the oil fields are held so absolutely in control that the production may be arbitrarily cut into at any time, obviously it would be folly for the railroad companies to equip any great number of locomotives to burn petroleum. Further than that, it would be folly for any *one* company, not to say any number of the companies, to put itself in the power of the oil men. This makes plain at once the improbability of the immediate substitution of petroleum for coal, even on lines where the objections to smoke and cinders are very great, and where the handling of coal and ashes is costly and difficult. It may be said that the production of oil has never in late years been unrestricted, and that much more could have been put on the market had there been greater demand. True, but that only makes the argument the stronger, for it shows the solidity and efficiency of the power which has controlled this industry. It shows the more clearly the necessity for wariness.

An error has been pointed out in our report (issue of Oct. 14) of the action of the Committee on Hand Cars of the Roadmasters' Association of America. The Committee recommended a car not to exceed 550 lbs. in weight, not 350 lbs. as reported. Our report was furnished by the official stonographer of the convention, and from it was omitted, it appears, certain interesting action of the convention on the hand-car question. That is, the convention voted (32 to 6) to adopt the Sheffield, and later reconsidered the vote and the matter was postponed to another year. It was decided also to expunge this part of the proceedings, from the records of the convention, and that is why it did not appear in this report. The New England Roadmasters, however, at their Hartford convention 10 days later, did vote to adopt the Sheffield car.

This is undoubtedly an excellent car, but still it is radically bad for a representative association to "adopt" the product of any one maker. An individual or a company may in practice often do so with advantage; but the conditions must be very peculiar which will warrant an association in shutting out competition in a wide territory. Certainly there is no great reason for uniformity in hand-cars on the railroads of the country. There is not much interchange of this part of the rolling stock. The action of the Roadmasters of America at Cleveland was wise in principle, whatever may have been the merits of the individual case. The Master Car-Builders saw the necessity of some protection against sudden and ill-considered action when they inserted in the constitution of their association the provision that any device which is covered by an existing patent shall be recommended to the association only by the Executive Committee. No doubt they were prompted to this by early experience. They had learned the dangers of special restrictive recommendations, and provided this additional check. Those matters in which the chances of hasty action are greatest, therefore, may come to the association through the special committee appointed to consider them *and* the Executive Committee, but they must be presented by the latter for action. It would be well for the younger bodies to take a lesson from the experience of the association which has done so much for the art of railroading. Apart from the objections to action which unduly favors individual owners or patentees, there is also this to consider, that lightly considered recommendations are pretty sure to be worthless, when they are not positively injurious. It is not a great many years ago, but before their present constitution came into force, that the Master Car-Builders came very near adopting as a standard a draw-bar which has long been antiquated. The weight of the recommendations of these associations of railroad officers depends almost entirely upon the care and wisdom with which they are considered, and especially on the preliminary work of the committees. If they are obviously careless or unstudied they carry no present weight, but lessen the future influence of the body which makes them.

STRAINS IN COUPLING RODS.

In another column we print a communication criticising Prof. J. B. Johnson's recent communication upon the stresses in side rods. Professor Johnson urged that the chief stress in a coupling rod was that caused by centrifugal action, which, as he said, would be at a maximum at the foot of a grade and might be that due to a speed of train of about 70 miles per hour. Now 70 miles per hour is not a usual or common speed for a passenger engine, excepting down grade, and when running down grade there will be little or no steam stress passing into the side rods. Professor Johnson's assumption that the minimum stresses in passenger engine rods takes place at 70 miles an hour, and that this stress is due solely to centrifugal action, may be taken as well founded. Our correspondent, Mr. Lindström, however, states that the tendency of the rod to buckle as a column or strut is liable to be greater than its tendency to break from centrifugal action. But he ignores, in the first place, the fact that, while many rectangular rods have broken from centrifugal action, none, we believe, have failed by buckling *laterally*. Hence, it would have been well if our correspondent could have given us some reasons more in accordance with actual practice or results. He next goes on to the case of the freight engine, and he takes a very short side rod, of 52 in. only, and shows that for a working allowance of 12,000 pounds per square inch extreme fibre stress a rod need not be more than $1\frac{13}{16}$ in. deep, but he gives to this same shallow bar a breadth of $3\frac{1}{4}$ in., because of the tendency to buckle laterally. Herein he shows that he has only partially considered the question, for it is quite clear that, even neglecting centrifugal stresses entirely, there is a far greater tendency for a rod to buckle up or down in a vertical plane than laterally. The reasons for this are clear. Laterally considered, the side rod is a pillar, each end of which has a square bearing, if, indeed, it may not be even looked upon as a strut fixed at both ends. Vertically, however, the rod ends are most decidedly hinged, and hinged, too, upon a well-lubricated pin, excepting when the rod is continuous to an adjacent wheel. Now, the relative resistance to buckling of round and flat-ended struts is as 1 : 3, so that for lateral buckling the true strength of the rod figured out will be three-fold that given. We are here assuming that Mr. Lindström's figures are correct, though Mr. Johnson shows that this is very doubtful if calculated on modern column formulæ.

Mr. Lindström, however, who would make the rod $3\frac{1}{2}$ in. wide, leaves it at only $1\frac{11}{16}$ in. deep, in spite of its three-fold tendency to buckle vertically, evidently quite overlooking the fact that the rod would not have any special objection to failing in this plane equally with the horizontal, and if buckling must be provided for, the mode of connection upon cylindrical pins demands that the moment of inertia of the bar section taken vertically be three times the horizontal section moment. If, for the sake of argument, it is allowed that centrifugal force is of but *little* account, it has *some* effect on the rods, and would add to their vertical tendency to buckle, and a still greater than three-fold moment of inertia is thus called for in the vertical section as compared with the horizontal.

It is a matter of common observation that when freight engine side-rods have broken there has been almost invariably some initial flaw in the metal, and the shallow rod $1\frac{13}{16}$ in. deep, as found to have a working stress of only 12,000 lbs., would be very much more severely strained under a passenger engine with even much larger wheels.

As the bending stress in a rod increases with the weight and the length, and the weight increases as the length for the same sectional area, it is evident that centrifugal stress increases as the square of the length for rods of the same section. It decreases as the square of the wheel diameter and increases as the square of the speed. Hence, taking the 52-inch rod of our correspondent and doubling it in length will give a quadruple stress. With 80-in. in place of 50-in. wheels, the stress is reduced as 64 : 25, and raising the speed from 50 miles to 70 again increases the stress as 25 : 49. Hence the final stress in a passenger rod of the same section as the short rod of our correspondent's illustration would be strained :

$$\frac{12{,}000 \times 104^2 \times 50^2 \times 70_2}{52^2 \times 80^2 \times 50^2} = \text{nearly } 37{,}000 \text{ pounds.}$$

Thus it is plain that while a very light rod may be safe enough for a freight engine where rods are short, the case of the passenger engine is very different indeed, and even for the case supposed, we cannot at all agree that the side rod of an engine should have a square section rather than a flattened rectangular section, if only for the reason given above, that the buckling tendency is greater in the vertical than in the horizontal plane.

Now in respect to the buckling tendency spoken of we doubt very much indeed if such a tendency exists, for as soon as the one side rod begins to buckle it must inevitably throw a greater stress upon the opposite side rod and it appears very probable that rods as made are fully able to transmit all the compression coming upon them; but that if not so able, then the stress, which they refuse to stand up to, passes as torsion through the axle and as tension or compression through the opposite rod if not first absorbed by the rails. True, there is a position of crank arm which makes the one arm incapable of taking up the stress thus thrown upon it from the other side, that is,

when the piston of its side is on the dead point. In this position one pair of wheels may revolve through quite a considerable angle without moving the coupled pair, owing to the absence of any lever arm of the wrist pin. This, of course, supposes the crippling of the arm on the side where the wrist pins are fully up or down, and is very little likely to occur. Indeed, practice teaches us that it does not occur. Rectangular passenger rods frequently break, but we know of no case of an I or girder section rod having broken; and though calculation shows fairly high stresses for these at the assumed high speeds of 60 and 70 miles, it must not be overlooked that maximum speeds are of rare occurrence and may be allowed higher working stresses. As the theory of the stress due to centrifugal action assumes the side rod to be in the position of a beam supported at both ends and loaded uniformly through out its length, or nearly so, according to the form of section at the ends and at the middle, it may not be out of the way for us to point out that where there are more than two pairs of wheels coupled the conditions become very different, and the principles of the continuous girder become applicable, for a point of contrary flexure obtains and both the strength and stiffness of the rod or of the various sections of it are increased. This is a further argument in favor of lighter rods for freight engines which have several coupled pairs of wheels than for 4-coupled passenger engines having single rods only, and it is only by extending such coupling rods to half their length beyond the pins or by adding an equivalent balance piece of shorter length that such rods can also be placed in the position of continuous girders. So arranged a rod becomes at once 50 per cent. stronger, but in all doubly as heavy. Its stiffness is increased similarly fivefold against deflection, and the tendency to wear the pins is thus reduced though the centrifugal pin stress is increased. For high speeds it appears that such a method would afford a means of securing a safe rod without undue depth.

The correspondence does not appear to have seriously shaken Prof. Johnson's position as regards the centrifugal force; and as regards the buckling action, the idea of making a coupling rod wider than it is deep will not bear serious examination. Generally the breakages of the ordinary flat rods have not been numerous, and the modern rods may be taken as fairly filling the bill on the score of sufficient strength every way. Prof. Johnson's section of 6 in. deep is probably more than sufficient, and it is likely that the extreme fibre stress of 12,000 lbs. is not actually attained, but that this stress is much less, for it is very usually supposed that in bars exposed to bending much of the extreme fibre stresses are taken up by the portions of the bar nearer the neutral axis. This fact, if such, goes far in explaining why many side rods have not broken, whereas hardly one of the old-fashioned rods has any apparent right to exist unbroken for a day. It adds but another example to the long list of subjects which have been worked out by daily experience before any attempt has been made by theorists to place them in shape by mathematical reasoning.

Export Rates to Boston.

One of the most important and interesting cases now before the Inter-state Commerce Commission is that which has arisen in connection with the rebates on the Boston export trade.

The matter came up before the Commission at the outset. Boston traders and Boston railroads both desired the Commission to authorize the payment of such rebates, on the ground that without them the Boston export trade would be crippled. Nothing positive was settled at the time, but the railroads were given strong grounds to infer that the Commissioners did not disapprove of their practice. The facts are these. Wheat has the choice of several routes from Chicago to Liverpool. It is obvious that on any of these routes the total charge must be approximately the same. In other words, the rate from Chicago to Boston plus that from Boston to Liverpool must be the same as that from Chicago to New York plus that from New York to Liverpool; and the same would of course hold true of Philadelphia or Baltimore. Now it so happens that ocean rates from New York to Liverpool are nearly as low as those from Boston to Liverpool, the average difference being not much over one cent per 100 lbs. This is cheaper because New York is the natural distributing centre of most of the merchandise imported to this country, and therefore there are more vessels there which desire to take return cargoes of freight. This advantage in New York makes up for the lower port charges and slightly shorter ocean voyage which work in favor of Boston. If the railroad rates to Boston were made higher than those to New York, it would be a most serious blow to the transit trade of the former city.

We hardly understand how serious it would be until we come to detailed figures. If the railroads charge five cents a hundred more to Boston than to New York, it means that the ships must charge five cents less for the remainder of the route. This is equivalent to a dollar per ton of cargo, or perhaps two thousand dollars net difference on the cargo of a large vessel. Even this takes no account of the superior ease of getting a west-bound cargo from Liverpool for New York, which would tend to make the disadvantage very much greater.

Competition thus brings Boston export rates down to the level of New York export rates, and leaves no other possible alternative except the practical abandonment of the Boston export trade. But in domestic traffic it produces no such necessary equality. In fact, in spite of all attempts to secure substantial equality, the system of special rates has undoubtedly resulted in lower charges at New York than at Boston. The intensity of the competition has been greater at New York, the volume of traffic larger, the prices charged to the consumers on the whole lower. All these things have combined to give New York lower railroad rates. Of course this has helped the growth of New York at the expense of Boston; but the effect has not been so sharp as it would have been had any similar inequality existed in the export trade. It has simply tended somewhat to lessen Boston's importance as a distributing centre, without by any means destroying it.

It is doubtful whether the present year puts Boston on a worse footing than formerly. But it makes its relative disadvantage more obvious. As long as the system of special rates prevailed no man could say just what the difference was. To-day its amount is seen and felt. And it is also felt by many that this is a kind of injustice which the Commission ought to remedy. The Boston merchant sees that his rates are higher than those for the same kind of traffic at New York, and also higher than the same traffic at Boston if intended for export. He demands relief for this inequality, if not on the first ground, then on the second.

We do not ourselves believe that the Commission will see fit to make any order in the premises. If they should undertake to equalize matters they would have to do one of three things: Raise the New York rate to the level of the Boston rate, raise the Boston export rate to the level of the domestic rate, or lower the Boston domestic rate. The first is obviously out of the question. It would neither be desirable nor practicable. The second would be the most serious misfortune which could befall the commerce of Boston, and would be the very last thing which the complainants would desire. The only thing which would give any satisfaction would be a direct order for the reduction of the Boston domestic rate.

The Commission would have no right to base such an order on the difference between the New York and the Boston rate. It may be—in fact it almost certainly is—the case, that this difference is greater than the difference in cost of transportation to the two places. But what of that? There is nothing in the act of Congress which should justify the Commissioners in taking this into account. There is nothing which says that if a common carrier makes a reduction of rates on one line he must make a corresponding reduction on other lines. If the Commission is to take any action at all, it can only be justified on the fact of the difference of treatment of export traffic.

Now against any demand for enforced equality between export and domestic traffic, the railroads have several ways of defending themselves. They might meet it by raising the export rate, which would hurt Boston much more severely than it would the railroads. They might content themselves with giving the rebate to continuous shipments by rail and water in connection, which would probably take the matter out of the jurisdiction of the Commission. Or they might contend that the circumstances and conditions of export traffic are not substantially similar with those of domestic traffic. And this we believe is their strongest ground.

It is not generally known how universal are the precedents which not merely admit but in some sense prescribe such a practice. In Europe, where the question of export rates meets the railroads at every turn, special tariffs of goods for export have become the rule. They are made on all sorts of goods and on state as well as private railroads. Prussia allows a rebate in favor of coal to be used outside of Germany, and thus more directly subject to foreign competition. Cotton goods from Manchester to London for domestic consumption are charged 60 per cent. higher than those intended for export. In the very earliest important railroad charter in the world, there was an extreme provision of this kind—the tolls for export coal being fixed at one-half penny per ton per mile, while those for domestic consumption were four pence per ton per mile.

In the face of all these precedents on the one hand, and of the practical difficulties of the case on the other, it seems improbable that the Commission will attempt to take any action. But if they refuse to do so, it will open the way for an important series of exceptions to the operation of the act; or rather, it will widen one series of exceptions which the Commission has already seemed disposed to make. It will show that foreign competition furnishes a ground of exception not merely to the long and short haul clause, but to equal treatment of traffic which is, in all other respects, under substantially similar circumstances and conditions. If this point is admitted, it will give much greater freedom to railroad managers in interpreting the act. It will give them the right, in a large class of cases, to charge what the traffic will bear, avowedly and openly, and have the protection of the authorities in so doing.

Does it Pay to have Brakemen on Passenger Trains?

An article in the *Railroad Gazette* of Aug. 26, concerning the necessity of manning passenger trains with brakemen instead of mere train porters, led a contemporary to undertake the silly task of setting up a man of straw and then invoking the aid of people all over the country to knock it over. Three columns are filled with evidence to prove what everybody acknowledges and nobody questions, that the Westinghouse automatic air brake is an exceedingly valuable and reliable appliance and very rarely fails. The *Railroad Gazette's* opinion of this brake is so well-known that it can hardly need re-stating. An efficient power brake is not only a necessity on passenger trains—every one who neglects to provide it being not only foolish but wicked—but it may now be said to be absolutely demanded on freight trains. The testimony of a number of well known managers—each statement a repetition of the others—is adduced, the substance of it being that these men never knew of a failure of the brake except from lack of care.

The only portions of this matter that have a bearing on the view presented in the *Railroad Gazette* are the statements of General Manager Barnes, of the Boston & Albany, and General Manager Thomas, of the Richmond & Danville. Mr. Barnes says that he obeys, without questioning, the Massachusetts law requiring half as many brakemen as there are cars, because the brakemen can make themselves useful in caring for the comfort of passengers and in other ways. Mr Thomas says that to keep men rigidly drilled so that when an emergency came they would not be found napping would cost more than it would be worth; and that to provide for the few cases where air pump failure or engine failure rendered the brake inoperative it would be cheaper to put air pumps on all freight engines than to have sufficient brakemen on all passenger trains. These two views present the opposite sides of the question quite fairly.

We said that *brake*men were necessary; we did not specify any number, but plainly implied that it should be more than *one*. We said that the best brake will sometimes fail, but plainly showed by the context that we had in view not only dangerous failures but others, such as disabled air pumps broken down and engines 100 miles from home, as well as failures to stop on account of unopened valves, or other negligence. Emphasis was placed on the usefulness of brakemen as train porters and as rear signalmen, signaling being widely neglected because conductors have a feeling that they cannot spare their man. Thus Mr. Barnes supports our position, and Mr. Thomas touches upon the only objection to it, that of cost; and the question is, whether the former answers the latter.

If brakemen on passenger trains were of no benefit except as brakemen, they might be too costly a luxury; though whether they were so or not, it would be useless to urge their employment, for the temptation to reduce expenses would be so great that even the few that now are employed would quickly be discharged. But they are of value, and Mr. Thomas and those who agree with him should ask themselves whether or not the Massachusetts roads have given way to sentiment or are still dealing in hard facts when they retain a liberal force of trainmen and make no complaint of the law. Roads all over the country are constantly spending large sums of money for the comfort and convenience of

their passengers; perhaps they might spend a larger share of this for wide awake, alert *men* on passenger trains. A man of the right degree of intelligence can, as the passenger agents boast, "put forth every exertion to make patrons comfortable," and at the same time combine with this the qualities of a reliable brakeman; and examples are not wanting.

Attention to hand brakes is not so entirely unnecessary either. The English reports of brake failures show, as we have heretofore pointed out, that the majority of dangerous failures of automatic brakes are the result of pure carelessness, such as omission to couple hose or open cocks; but cases where the trouble could not easily be provided against, and involved real danger, are by no means wanting. Poor piston packing, dirty pump, defective washer, slackened nut, broken pump, iron pipe broken while running, and triple valve on tender frozen by water from tank, are among the unforeseen causes that have shown themselves in English experience.

A practical way to put the question is, shall we have *brakemen* to act as baggageman, train porter, flagman, etc., or shall we employ baggagemen, flagmen, etc., to give the necessary attention to brakes? Many roads have persons enough on the trains, but do not get enough out of them. Most roads depend upon the train baggageman in an emergency, but do they train him to be an alert brakeman? Is it prudent and sensible to have a porter, or water boy, or ticket collector, or in fact any employé on a train, and not have him trained to rush to the brakes on signal? If these men *are* employed and are required to have an eye on the brakes let them be called brakemen, and understand that the braking duty is not a mere form. It is objected that men should not be held to perform a duty that may call upon them only once in ten years; but in its same issue our contemporary commends the training of shopmen to respond to an alarm of fire which may not come to them in forty years.

Mr. Thomas thinks the use of hand brakes on occasional trips, for the purpose of keeping men in practice, would be fraught with danger equal to that of going without brakemen. It is not exactly apparent what he means. The air power as an emergency brake in the hands of the engineman could be left wholly undisturbed, and the chief danger would be the negative one that too much stopping, or stopping at wrong places, might cause inconvenience; but the notion that it is dangerous to stop a train ought not to have any excuse for existence on a properly managed railroad.

Well-understood Rules and What they Cost.

Mr. John M. Goodwin writes to the *Railroad Gazette* in allusion to the fact that he has for 17 years persistently reminded the railroad world, and especially those companies for which he has worked, of the necessity of perfecting precept before attempting to have perfect practice; in short, that he has been an indefatigable missionary in a line which has furnished the text for many an appeal in the editorial columns of the *Railroad Gazette*. So long ago as 1874 Mr. Goodwin, in a report to the Lake Shore & Michigan Southern, said:

> It is of vital importance to have a carefully considered scheme for the guidance and *government* of officers and employés, in every department, in all the ordinary operations of the line, and in every case of extraordinary combination of circumstances that experience has shown to be an occasional or *possible* event in railroad operation; such scheme to be clearly and explicitly set forth, in a form convenient for reference, and thoroughly *indexed* and *annotated*; and that *every man* connected with the line be required to make himself thoroughly familiar with, and *to live up to* the code thus established.

Mr. Goodwin sees a slight general improvement in the practice of the roads at large in the promulgation and manner of enforcement of rules, but is awakened by the Kouts collision to a renewed sense of the necessity of reiterating the truths already so many times repeated. He deplores the continuance of the old "inexact, inexplicit, incomplete and insufficient" ways of making and issuing orders, and points to an example, in the scrap printed in the *Railroad Gazette* of Oct. 7 (page 655), which says, "flagman should have left the train to go back when it was running not less than eight miles per hour." Mr. Goodwin explains the backhanded construction of the sentence, which indeed was apparent to every careful reader. He then goes on to express the present state of things as follows:

> There is no true discipline. There is no education of trainhandlers to a well-based code, because there is no such code. There is no due subordination of every man to proper authority, because there is no authority. In place of "authority" to fall back on the trainman has "orders," and the man who gives the orders is a law unto himself. His "authority" is his personal judgment, growing largely out of his idiosyncrasy, more or less affected by the teachings of experience. And in many cases the "experience" of a man who has been "lucky" teaches him to do mighty risky things

Away with bulletin-board rules altogether! says Mr. Goodwin, and he goes on to demand the reforms which the readers of the *Railroad Gazette*, especially those whose interests are chiefly in other departments of railroad work, have perhaps grown weary of hearing about.

Superintendents do continue their old, poorly-arranged codes, and they do continue to issue orders without getting assurance that they are understood, hence the warning due to them if ever needed is still needed. As to whether these officers, who should be most directly interested, are bored, is a question. Many of them acknowledge the force of what is said, but take no action. Many who would take action are deterred by lack of means. Railroad practice in this country has grown up during the last half century and has reached its present state under certain principles; one of these is that a certain grade of intelligence (costing a certain average amount) is required in train running. We call this a principle because it has become so firmly fixed that all practice is based upon it. The earning capacity of a road and its duty to the public in the making of reasonable rates have been calculated on the prevailing scale of wages so long that a proposition to make a radical change is scouted as wild and visionary. To suggest the improvement of train service, the enhancing of the safety of passengers and property, by doubling the pay of enginemen, conductors and brakemen, of station agents, switchmen and trackmasters, would render the proposer a candidate for the insane asylum; and yet we have not stated the case so very much more strongly than it will bear. A Western road recently increased its expenditure for rear brakemen on certain trains *fifty* per cent.: it is nothing strange for a treasurer to have his salary raised more than that percentage within a short time, and yet to the telegraph operators, freight conductors, and others who have passengers' lives in their hands an increase is grudged, though it may be questioned whether an investment in the last named line would not pay as well as one in the former. Many who might agree with us thus far will cry, Impossible! doubling pay does not double men's efficiency. Directly it, perhaps, does not, but as long as there is a market for intelligence, and as long as highly intelligent men can do railroad work better than those possessed of poorer endowments, there will be a direct relation between money paid and value received. Whether an increase be 10, 50 or 100 per cent. the superintendent must have the appropriation before he can adopt any means of progress. Whether he improves his present personnel or substitutes new men makes little difference in the financial question. If a railroad college were started and brakemen and firemen educated in it the cost of brakemen and firemen would be increased just as surely as if a specific advance were made in the present wages of those classes. Calling for competent men (whether they fit themselves in a railroad college or in a freight caboose) and offering certain wages for a certain grade of intelligence will, in time, bring the grade that is paid for. To pay the same amount to the present men and enjoin them to bring themselves up to the level of their increased wages is a different way of doing the thing, but, perhaps, in some cases quite as effectual. A combination of both these ways is doubtless the best solution. To make a "horizontal" increase of wages without demanding increased efficiency is a waste of money. But the demand must be explicit; and in the calling for competent men, above alluded to, to omit to give the very fullest and clearest particulars of what is wanted would be like ordering a builder's apprentice to construct a mansion *carte blanche*. As we intimated in beginning, railroad practice in this country has grown up very largely on "*carte blanche*" principles. "Are you competent to run a train?" "Yes." "Then I appoint you conductor." This is the whole substance of many a negotiation. But a year of disasters like 1887 opens our eyes—or should open them—to the necessity of improvement.

Men who will more carefully obey orders must be had; either those who are now employed should be made to do it or others should be put in their places. But this costs money, and those who have any hope of achieving anything in this line should make up their minds to courageously ask the directors for increased appropriations. Even if a superintendent were, by his own individual exertions, to educate his freight brakemen up to the level of conductors, it would increase his pay-roll just as surely as would an order from the general manager; for the men's added intelligence and broadened minds would be powerful levers by which they could pry themselves out of their places and into more desirable ones; and the superintendent could then do nothing but go back to the old grade and begin over again. But would not the training pay?

The poorly constructed sentence cited by Mr. Goodwin is a sample of what is often seen in railroad rules. The maker knows what he means, and most of those whom he addresses know or soon study out the meaning. But clear language should be sedulously cultivated and insisted upon in all departments, if for nothing more than the improvement in habit. Persons who issue orders, if compelled to express themselves clearly, will inevitably come to think more clearly. This is a law of mind. Few indeed are those who are beyond improvement in this line. Some of the most careful work of the train rule committee of the Time Convention was required in the construction of the phraseology. In the case under consideration the meaning was: "When you saw that your train was about to stop you should, while it was yet in motion, but before it had slackened to a rate below eight miles an hour, have got off to go back," etc. Or, if still more simplicity be deemed necessary the construction might be: "The flagman should have got off and gone back before the train stopped. He should have done this as soon as the speed was slackened enough to admit of his getting off safely. A safe speed is eight miles an hour."

But most superintendents look with horror on verbosity. The use of too many words is a danger they are always guarding against. To break into three sentences a statement which might be put into one is especially heretical, and not one orthodox superintendent in a hundred will approve of the last of the above examples. But words are only vehicles of thought, and there should be just enough of them to best convey the desired idea. Brevity which is effected by merely cutting off instead of condensing is a loss rather than a gain. To insist on putting everything into few and lengthy sentences is like carrying all kinds of freight in 40-ft. cars; it is much more economical to have some shorter ones so as to get more carload shipments. We published the Pennsylvania superintendent's bulletin, because the good features of his practice deserved notice in spite of the presence of the objectionable ones. The merit in his method is somewhat exceptional; the weak point is, unfortunately, *not* peculiar to him.

The Freight Claim Department.

The division of labor so apparent in manufacturing and in business has in transportation resulted in the creation into separate departments of lines of work which were at first considered merely as clerical subdivisions of the general office. To-day we find the General Claim Agent an important officer on many railroads and practically independent as regards the details of his department, while formerly the examination of claims was done by a bureau in the general freight agent's office. There is no doubt that the business of caring for claims has grown beyond the limits of a mere bureau. This work has increased enormously, and no one without actual experience can easily realize its extent. The overcharges and damages with the papers in the cases, which arise from the traffic of one station, when multiplied many times over, make necessary an amount of detail work for the supervising officer and his clerks of which the public is ignorant and consequently often unappreciative in its demands for prompt settlement. The increase of work in this line is of itself a sufficient reason why it should as to its details be no longer a burden upon the attention of the general freight agent. This is amply proved by the records of such roads as still cling to the old method of carrying on investigations solely through the general freight office. This record is to the effect that on account of the pressure of other matters calling for immediate action, the routine work of the claim bureau usually falls behind. Patrons, both small and great, say that a general freight agent's office is the hardest place of all from which to secure prompt settlement of overcharges or damages, however just. The creation of a special department for this work is directly in the line of system (which means economy) and responsibility for details from which experience teaches we may always expect the best results.

While this division of labor is necessary it has its bad side. Under the old system the general freight agent was expected not merely to audit the vouchers for payment—this being now often required—but to become familiar with the different stages in the investigation of difficult papers. This direct oversight by the head of the freight department was of importance to the correct solving of complicated claims in many ways. Coming in direct contact with the shipping public the general freight agent was in a better condition to judge of commercial customs, of changes in trade and of the character of the claimants than any one else could be. It is a matter of regret that the evolution of railroad administration seems to take more and more the direction of removing the higher officials from that "touch" with the shipping and traveling public and even with their own employés, without which the highest success in railroading is impossible. To no depart-

ment of transportation do these remarks apply with more force than to the department of claims. In the hands of an officer separated from the living and breathing machinery of traffic and sensitive only to the wish that the amount of payments may be kept down to the lowest point, the claim department may change from a help into a stumbling block to the railroad's success.

The general claim agent being established as an officer charged with important duties, let us consider what those duties are. In the first place he should have such room, such books and such a number of clerks as to enable him to transact the office routine with dispatch and in order. His system should be such that the neglect of any station agent or other employé to answer promptly questions as to detail should be followed up by a notification that the delay was noticed and condemned. Where the offending party is a connecting road a request for a reply should also be sent after a reasonable time. These matters should never be left, as is often the case, until some indignant shipper sends a letter of inquiry. In regard to the best system of book-keeping and of arrangement of office details, it might be well if claim agents would meet each other oftener after the pattern of the mechanical departments. Such meetings could be devoted partly to the discussion of how best to dispose of doubtful claims, and also what reforms could best be introduced in accordance with the progressive spirit of the age. This latter it is also the duty of the freight officers to discuss, but as the claim officers already are independent as to office management it will not be long before intelligent action on their part will be expected on the important matters affecting the laws and practices of carriers' responsibilities.

The easiest way of regarding the claim agent's duties is the technical one. Certain rules are established by himself for his guidance. If the papers in any particular claim show that the case falls within the prescribed rules, it is placed on file for favorable consideration. If it falls without the rules it is at once under suspicion. Whether such a system is a fair one depends largely upon the rules, and in the making of these the other party in interest—the mercantile public—is not consulted. The just officer takes this fact into account and is careful to see that the custom of his office gives fair consideration to the case of the absent claimant, perhaps an ignorant trader whose claim may be good, and his presentation of it bad indeed. On the other hand, a claim agent whose standard is exclusively technical, and whose first question to himself is "Can I on any ground reject this claim?" will generally find the excuse he is looking for. This brings us to the real position of the claim agency, which is that of a court of equity.

From the time of William the Conqueror, English law has flowed in two streams, the common law and the law of equity. These two great branches of our legal system are now nearer together than ever before, but are still distinct. If the common law seems to do an injustice, the equity court will interfere. The department of claims is in many respects like equity practice; it should not be bound too strictly by technical rules in judging of claims. Unnecessary restrictions or at least restrictions upon the filing of papers which seem unnecessary to the merchant, should be avoided if possible. An example is the rule of a prominent Southern railroad system that claims should be presented only by the consignee and only to the local freight agent at the delivery station. Of course this rule is intended to simplify the system, and no doubt some double claims have been put in by both shipper and consignee. But the practice is open to objection. Aside from the fact that it is not legal—for the owner of a claim, whether by direct loss or by assignment, would seem to have the right to seek redress at either end of the road—it is contrary to a growing tendency which competition is forcing upon shippers, to become responsible for the delivery of goods sold, especially to small traders. The latter deduct their losses from invoices, and the shippers, if the claim against the transportation company looks reasonable, hesitate to take advantage of their legal position and sue the consignees. The easiest thing to do is to put in a claim on their own account, and if bills of lading and freight bills are attached, there should be no danger of duplication. It is a maxim of good transportation that the conditions imposed upon the traffic should as nearly as possible conform to the customs of the commerce it serves. This has been the line of many decisions of the English Railway Commission, and is in accordance with common sense.

Equity demands that a distinction should be made between claims which are fair upon their face and those whose fairness can be determined only after investigation. The former deserve the promptest treatment, and unnecessary delay is without excuse. An example is an overcharge, over and above the bill of lading rate guaranteed by the initial road. Such a claim, which is a clear violation of the rate agreement, merits settlement at once. It is the neglect of this simple requirement which has led the states of Texas and Arkansas to pass laws compelling the delivering roads to accept a tender of the bill of lading compensation. Our railroads should long ago have arranged this kind of overcharge among themselves without waiting for adverse legislation. To receivers of freight the prevailing practice is particularly aggravating, and moreover few general officers now seriously defend the usual long delays in such cases. Why do not clear-headed managers take action to facilitate the payment of claims, about which there is not a shadow of a doubt, instead of letting things run until their customers become aroused and pass laws at a high pressure, which may cause serious inconvenience if not injustice? A chief difficulty seems to be the desire to keep the responsibility and the auditing of each road's claims to itself. This is laudable enough, but has been carried too far. The relations of roads in a fast freight line, for illustration, are of necessity very close. In many things they trust each other completely; why not do so in honoring bills of lading? Under the present plan on many lines, the proportions of each road must be figured out and the consent of each road obtained to charge it back its proportion of the overcharge, before the first steps are taken toward refunding to the owner the money which he ought never to have been compelled to pay in the first place. A tariff is a bargain which a railroad is bound to live up to. A shipper does not know where or how an overcharge arose, and it should not concern him. It is a matter of railroad detail which should be arranged *after* the wronged party is righted. What do we think of a merchant who declines to refund an excess at once on the ground that his clerk made a mistake? The solution of the matter lies in authorizing any road to refund an overcharge caused by a plain error, the amount to be divided afterwards, perhaps through a system of clearing house balances. Here is a fair field for reform which should at once be occupied by our general claim agents. It is in their department; let them take steps toward fairness to their customers before compelled to do so. The case of the Little Rock & Fort Smith Road *vs.* Hanniford, recently decided by the Supreme Court of Arkansas,* should be a warning to those of us disposed to believe that our own technical rulings decide the principles of all claim matters.

Equity also demands that cases requiring investigation should be pushed with all reasonable dispatch. There are railroads—and their names could be given—who make a deliberate practice of pigeon-holing all claim papers, sometimes for six months or a year, and sometimes till requests for explanations come in. Can there be any question as to what their creditor patrons think of them? If the effects of such a policy touched only themselves, there would be little need to say much about it; but unfortunately, as we all know, the public does not discriminate very justly; and besides if such a road is part of a through line it may keep back a claim which its connections are ready to join in paying; this, under the vicious system already referred to. There is great need of the cultivation of a spirit of manliness in business among railroad officers.

We do not forget that the public, as represented in the army of claimants, has a multitude of sins to answer for. There is a "heap of sense" in that clause of a well-known traffic man's announcements which reads "it is suggested that courtesy is equally commendable whether practiced by the" public or the railroad man. The reader will understand, however, that just now we are speaking especially to railroad men. A road which declines to meet its obligations to the public or to a connecting road should be made to feel the scorn and contempt it deserves. "Public opinion" is a phrase just as applicable among railroads to their own business, as to political or social matters outside traffic.

It is a remark sometimes heard among traffic men that the restrictions of the usual bill of lading are too stringent, that if strictly lived up to there would be scarcely any loss which a railroad would have to pay, and, as this will never be legally admitted, that we are in danger of overreaching ourselves by our own cunning, and by trying to grasp everything may lose important things. There are two sides to that question, but this much is true, that the law gives the railroads a great advantage in that it admits the restrictions of the bill of lading as *prima facie* true until the shipper (plaintiff) proves negligence. He can prove negligence and hence establish his suit only through the testimony of the railroad defendants themselves. We all know how difficult this can be made. Knowing this, what course should the claim agent pursue? Rest upon the difficulty of proof and decline to investigate, or investigate but partially? If he be anxious to "make a record" he has here a strong temptation. It is a matter of congratulation that many are superior to it. But the man who takes a broader view than merely how not to pay is not only right on the common ground of fairness, but is really doing what he can to keep for his road, and so, broadly, for all the roads, the advantages now theirs. The whole bill of lading question is a complicated one, and the railroad position and rights may be completely changed if the belief among the shipping public that that position is used to defraud claimants continues to grow and spread, and crystallizes into action.

An abstract is given on another page of the twentieth annual report of the Boston & Albany. The average passenger and freight rates are substantially unchanged. There is shown a decided increase in traffic and in earnings, as well as in expenses. The increase in freight earnings is 4.5 per cent., in passenger earnings 9.4 per cent., in operating expenses 9.6 per cent., and in net earnings 2.5 per cent. The increase in ton-miles is 3.9 per cent. and in passenger-miles 7.9 per cent. It will be seen that the passenger business continues to increase more rapidly than the freight, as in the past, although the ton-mileage was more this year than in any year since 1879, excepting in 1881, when it was 417 millions, against 406 millions this year. The passenger-mileage, however, was much greater than ever before. The traditional policy of the company is kept up, of charging improvements to the expense account and paying eight per cent. dividends.

That there have been very large expenditures for cars this year. Among the engines added are ten 60-ton freight, the heaviest in previous years being 43-ton. This accession brings the average weight of all the freight engines from 33.65 up to 34.60 tons, a material factor in the operating capacity of the road.

The President states that the practice of paying rebates on freight brought to Boston for export was resumed in accordance with the intimation of the Inter-state Commerce Commission that such rebates are legal, so long as no discrimination is made, and the business of the port now goes on much as usual. He adds that thus far the business of the company has not been injured by the Inter-state Commerce Act, and expresses the hope that through business may still be carried on without public injury if the liberal construction which the Commission and the companies are inclined to give to the provisions of the act are sustained by the courts.

* See reports of decisions on another page.

The Union Pacific and the Canadian Pacific have published earnings for nine months ending Sept. 30, and a comparison is interesting. The figures are as follows:

Union Pacific:	1887	1886	Per cent. Inc. or Dec.
Miles	4,594	4,476	2.6
Gross earnings	$20,781,842	$18,830,057	10.37
Op. expenses	12,337,591	10,062,824	2.27
Net earnings	$8,444,251	$6,767,233	24.78
Net per mile	1,838	1,491	23.
Per cent. expenses.	59	64	Dec. 7.8

Canadian Pacific:	1887.	1886	Per cent. Inc. or Dec.
Gross earnings	$7,904,408	$7 036,785	12.3
Op. expenses	5,807.567	4,529,727	28.2
Net earnings	$2,096,901	$2,507 058	Dec. 16.3
Per cent. expenses	73.4	64.3	14 2

The first half of 1886 the latter line was not operated through; it was opened for traffic to Port Moody late in June of that year. It appears then that more money was made before the transcontinental line was operated than since. Considering the immense distances absolutely without local traffic any other result could hardly be expected, but the figures given above put in a striking light the comparative unimportance of the transcontinental traffic.

Among the interesting questions which are brought out in Mr. Dudley's dynagraph inspections, some of the most important have been those relating to the life of ties. He has observed that on the Old Colony and on the Boston & Maine, although the road looks in better surface than where chestnut or oak ties are used, it does not take so good a diagram. The cedar ties with which these roads are largely laid are so much softer than oak or chestnut that when an inequality exists it extends over a longer portion of the rail. Thus the bends in the rails are longer, which is better for the rails, but the surface of the rails is not so good, and when a point begins to get low it not only wears into the tie faster on account of its greater softness, but it begins to cut into adjoining ties, which are not firm enough to resist the additional strain a low tie next to a high one produces. It would therefore seem to be a question not yet conclusively settled whether cedar ties are so economical as their greater durability would seem to imply. The greater amount of labor required to keep the surface in good condition, or the greater cost of hauling freight over the track when it is not so may in the end balance the supposed gain in using a wood which does not decay quickly, but is very soft.

The progress of compounding as applied to marine engines is shown by the fact that out of 474 steamers recently built on the Clyde, on the northeast coast of England, and at Aberdeen, 118 were fitted with ordinary compound engines, 396 with triple expansion, and 7 with quadruple expansion. It will be observed that no simple or non-compound engines were built. The degree of expansion in the quadruple compound engines would be about twenty fold in the ordinary working gear. This great degree of expansion renders possible the considerable economy gained.

The system of heating the cars of the Boston, Revere Beach & Lynn, described on another page, appears to be a very simple and satisfactory method of heating the cars of a local road, but it is obviously inapplicable to the requirements of a large road having a long main line and many connections and branches. As the cars cannot be left for more than one hour at a time, without being emptied of steam, or reheated with live steam from a locomotive, it would obviously produce much inconvenience should an engine break down or be stalled and the fire drawn in a snow drift. Any undue but unfortunately too frequent delay at connecting points would also be a source of discomfort to passengers. For a local line, however, the system appears admirably adapted, and is well worthy of careful study.

A statement has recently appeared to the effect that a syndicate of capitalists has subscribed the money to build a railroad from the northern border to Winnipeg, and it is assumed that this is the Red River Valley Railroad of Manitoba, and that the Northern Pacific has considerable interest in the subscription. Concerning this we may say, on the best authority, that the Northern Pacific, in its corporate capacity, has taken no step to that end, but how far the directors of the road are interested it is impossible to say. It is further rumored that the Northern Pacific is building an elevator at Pembina, where wheat will be stored in bond to be transported to the United States territory for Canadian markets or re-export.

A company of San Francisco capitalists under the style of the Mazatlan & Alamos Railroad Company is endeavoring to get control of the Sinaloa & Durango Railroad, intending to build between Alamos and Mazatlan, and is trying to secure right of way and bonds on many of the large estates on the projected route. Mr. Robert R. Symon, of Mexico and London, who was one of the syndicate which secured the concessions for the Sonora and the Mexican Central roads, obtained a concession for the Sinaloa & Durango, from a point on

the Gulf of California to the city of Durango. About 40 miles, from Altata on the Gulf to Culiacan, the capital of the state, was built under this concession. Mr. Symon also secured a concession for a road from the Sonora Railway to Alamos.

The Topolobampo company then secured a concession for a line from Alamos to Mazatlan with a subsidy of $7,000 per kilometer. The Sinaloa & Durango then secured a subsidy for like amount over the same line, and General Carbo was given a subsidy of $9,000 or $10,000 per kilometer for a line from Mazatlan to San Blas, the point at which the Guadalajara branch of the Mexican Central leaves the Pacific coast. The monetary depression, coupled with an epidemic of yellow fever on the Pacific coast, prevented any further development in that locality, and now, according to Mexican papers, Mr. Symon has been asked to surrender his concessions and is understood to have left London for Mexico, though, as the Mexican Government are understood to be about putting a new loan on the London market, this gentleman's visit to Mexico is more apt to be actuated by this consideration than by the present state of railroad projects in that country. Neither of these concessions by itself is of any value, as from Guaymas to Acapulco there is not a safe and reliable harbor (unless the belief that the entrance to Topolobampo Harbor fills up with sand after a bad storm is untrue) available for vessels of seagoing draft. But a line connecting the Sonora Railway with the Mexican Central might be a more important thoroughfare than the main stem of the Central: and passing as it must near large deposits of iron, copper and refractory silver ores, would get, with the agricultural products of the country, a large local traffic.

Our importations of iron and steel from Great Britain for the first nine months of this calendar year have been very heavy. They are given below, from the Bulletin of the American Iron and Steel Association. The imports for July, August and September are also shown separately:

Articles.	July, '87.	Aug., '87.	Sept., '87.	9 mos., '87.
	Gross tons.			
Pig-iron	32,566	36,764	44,590	331,316
Old iron	11,323	14,537	8,183	155,845
Steel unwrought	20,063	20,055	12,986	183,210
Tin plates	21,428	22,558	24 495	203,791
Hoops and sheets	3,691	3,751	6,221	27,302
Bar, angle, etc	142	218	548	2,417
Rails	27,766	19,890	22,790	135,621
Cast and wrought	160	245	272	2,238
Total	117,139	118,018	120,085	1,041,750

As tin plates on the average have only about 5 per cent. of their weights tin, and as steel has largely replaced iron in their manufacture, it will be nearly correct to assume that half of this large import was steel in some of its various forms. Although the fall in price of domestic iron and steel has greatly curtailed the purchases made in foreign markets, much material is still to arrive, and we will have to ship many bushels of wheat to pay for this year's importations.

Interest in the various associations of railroad men not only remains healthy but, it is gratifying to note, is also spreading. The letter referred to in these columns last week was from a well-known roadmaster, and in this issue will be found another, making interesting suggestions, from a prominent member of the Time Convention. An instance of the desirability of co-operation between different associations will be recalled by those who remember the discussions in the Master Car-Builders' Association concerning wheel treads. Mr. Forney at that time pointed out the fact that the form of a wheel and the form of a rail on which it runs being intimately related to each other, should be considered together, and that, therefore, either the wheelmakers or the railmakers acting independently would be likely to fail of the best results.

Prominent wholesale and jobbing merchants of St. Paul, in discussing the cost of delivering goods at local points in Northern Minnesota and in Dakota, have said that, notwithstanding the fact that the rate from Chicago to such points is considerably lower than the cost on the same goods when shipped to St. Paul and redistributed from there, they can continue to do business at a profit; their rents, salaries and other expenses being enough lighter than the same items in Chicago or New York to offset the difference in transportation charges. The contestants in the car-load rate cases should make a note of this. If jobbers at the smaller distributing centres can make a living in spite of favors shown the wholesalers in the large cities, the latter can appeal still more loudly on behalf of the oppressed small traders.

Under the title of "The Railway Question in Manitoba," in a recent number of the *Contemporary Review*, Prof. Goldwin Smith makes a strong plea for the Manitobans—a stronger one upon the technical points involved than we supposed possible. He points to the weakness of a Governor-Generalship bereft by the constitutionalizing process of all real power, and accuses the present government of too intimate a connection with the Canadian Pacific to allow of impartiality of legal action on its behalf. He quotes a variety of official utterances as evidence that the grant of monopoly for the Canadian Pacific did not include the territory of Manitoba, and lays stress upon the hardships which the province is suffering because "a single line does not open up the country for more than a day's haulage on either side, that is from 20 to 25 miles. * * * I am told that the spirits of the settlers in Southern Manitoba were almost broken by inability to bring to market the grain which their labor had raised." The Manitobans desire to keep the question of commercial union with the United States out of this discussion entirely; but, as we have before pointed out, it has been brought in evidently for effect in England as well as in Canada. Prof. Smith boldly maintains that the commercial unity of the British Empire was broken and ended by Australia's imposition of protective duties on British goods; and points to the absurdity of maintaining the "Chinese Wall" of tariffs between British America and the United States. The article, like much of Prof. Smith's writing, leans toward one beam of the balance, but it does not even pretend to be an impartial statement of the question, and he writes evidently from sympathy with an oppressed people.

General F. A. Walker's article in the current *Scribner's* is worthy of the widest circulation, for it is a diagnosis of the labor malady that suggests a remedy. General Walker believes that the workingman must hold his own against the pressure of competition, and have enough character to prevent either his degradation by inadequate wages, or the paralysis of business through unreasonable demands upon capital, but he says: "I have never known any considerable body of laborers, essentially Americans, of their own motion, without instigation and impulse from some organization of which the moving force was an alien one, make or insist upon an altogether unreasonable demand, or proceed to wrongful measures in enforcing even reasonable demands. Will some one point out such an instance, if he can?" The dangers of our labor agitations arise from what is foreign and un-American in its character. Our foreign population must be thoroughly Americanized, and be taught that fairness and moderation that has distinguished the American voter since the earliest days of town meetings and self-government. They need that political education which is the American's inheritance from the fathers of constitutional liberty.

The New York Central announces that the new time-table for transcontinental trains, which goes into effect Nov. 13, will effect a still greater saving in time than was mentioned in the San Francisco accounts, the time between Council Bluffs and Chicago being shortened a little so that connections will still be made with the fast trains over the Lake Shore and the Michigan Central. The skeleton schedules are given as follows: Westward, New York, 6 p. m.; Chicago, 9:30—10:30 p. m.; Council Bluffs, 8 p. m.; Ogden, 3 a. m.; San Francisco, 7:10 p. m. (fifth day). East-bound: San Francisco, 3 p. m.; Ogden, 8 a. m.; Council Bluffs, 8 p. m.; Chicago, 2:15—3:30 p. m.; New York, 8:15 p. m.

The New York Central officers say they expect shortly to be able to check baggage through to San Francisco and other points beyond Ogden, thus removing an unnecessary inconvenience which passengers have had to put up with at the hands of the Central Pacific ever since it was opened.

Record of New Railroad Construction.

Information of the laying of track on new railroad miles in 1887, not before reported, is given as follows:

Chicago, Kalamazoo & Saginaw, from Kalamazoo to Hastings, Mich., 31 miles.

Northern Pacific, from Grand Forks to Pembina, Dak. 95 miles; 68 miles since last reported.

St. Louis & San Francisco, from Jenson to Mansfield, Ark, 19 miles.

THE SCRAP HEAP.

The Hexthorpe Collision.

The driver and fireman of the Manchester, Sheffield & Lincolnshire Railway train were on Friday last committed for trial on the charge of manslaughter by the West Riding magistrates at Doncaster. Whatever feelings of indignation the public may have held against the men for the alleged disregard of the special instructions issued to them will be considerably ameliorated on learning of the number and the nature of the instructions and time-tables they were supposed to "read, mark, learn, and inwardly digest." It appears from the evidence that they were supplied with the ordinary working time-tables of the Manchester, Sheffield & Lincoln, the Cheshire Lines, and the Northeastern Companies, as well as special instructions and working time-tables for the 14th and 16th of September. The book of rules with which they were supplied contained 379 rules printed on 210 pages; and the special instructions, etc., exclusive of the North Eastern time-tables and instructions, covered 345 pages of printed matter, and they were supposed to work according to those tables and special instructions. This fact alone should exonerate the men from the charge of culpable negligence. The average individual is not brilliantly successful in carrying out even ten commandments, but if he had to conform to an extra 379 we are afraid that he would give up the line of business in which they were imposed. The other evidence given, in our opinion, hardly warrants the committal of the men for trial on the grave charge of manslaughter.—*The Railway Herald*, London.

Of course no road either in this country or England expects a runner or fireman to know every rule in the book, though most roads do, in this country at least, enjoin each employé to study *all* the rules; and they thereby weaken the force of the instructions, undoubtedly. Apparently the fault at Hexthorpe lay in the fact that the fireman saw the men with the red flags, but both he and the runner believed the flags did not apply to them and consequently put on steam, and did not apply the brakes until they sighted the stationary train ahead.

A letter to *Engineering* states that the distance which the train ran after passing the point at which the runner admitted having seen the red flag has been measured and is over 1,000 feet. During the magisterial inquiry it was admitted in evidence that there was space for a proper brake to stop a train twice from a speed of 30 miles an hour. The signalman at Hexthorpe Junction admitted that he had broken rule 162, which requires that when the block system is not in operation no train or engine shall follow another within 5 minutes.

"The Great American Desert."

At Ellsworth, Ellsworth County, Kansas, as a matter purely of speculation, some persons recently made up a fund to drill the earth to see what they could find. They were told by individuals learned in the geology of the region that the work would be fruitless, and advised not to waste the money, as there were no favorable indications. But the speculators went ahead with the drilling, and at a depth of 740 ft. they struck a bed of pure salt 160 feet thick, after which shale was encountered for 200 ft., and then at a depth of 1,160 ft. a vein of natural gas was struck which promises to yield fuel in unknown quantities.—*Ex.*

A Good Canadian Record.

The Toronto *Globe* calls attention to the running for the past six months of a special train over the Grand Trunk conveying copies of the paper between Toronto and London. The train consisted of an engine and a car, and the record for the six months shows that 158 round trips have been made at high speed, and on only three occasions did the train fail to arrive on time, and one of these occasions was confessedly the fault of the newspaper officials. A total run of 35,736 miles has been made within the six months without a single visit to the repair shop, or a single second's delay caused by any fault of the train itself.

Huddling the Milestones Together.

Mr. Buchanan, Superintendent of Motive Power of the New York Central, tells a New York *Sun* reporter that he has with his engine, No. 522, traveled three miles in two minutes and three seconds, or 40, 41 and 42 seconds per mile, respectively.

A Fountain of Youth.

About three years ago, according to the Galveston *News*, the Texas & Pacific road undertook to sink an artesian well near Sierra Blanco, 95 miles east of El Paso, Tex. The pipe was down 600 ft., when suddenly a cavern was struck, the drill dropped about 6 ft. and a current of air rushed up the pipe. The well was abandoned, and the tubing acted as a flue from the cavern to the surface of the earth. Ever since the people of the vicinity have resorted to the spot in summer to enjoy the cool and invigorating air that comes up the pipe. The current of air ebbs and flows like the ocean tides, the current being outward one day and downward the next. The upward flow has been discovered to possess magnetic properties, and the people who live near the well call it the "fountain of youth." Excursion tickets from New York have not yet been put on sale.

Gravity of Demeanor Brings Pleasing Experiences

There is in Griffin, Ga., a small, fat child of remarkable gravity of demeanor, and of an investigating turn of mind. The other day he climbed to the cowcatcher of a locomotive, and then, when it was in motion, fell off. With rare presence of mind he lay perfectly still until the entire train had passed over him. The experience pleased him, and the next day he went down to the depot and, unseen by the engineer, lay down on the track and waited there until the train passed over him. He is now pining in the seclusion of the parental backyard.—*N. Y. Sun.*

Work for the Legislature.

"Excuse me, sir," said a portly gentleman, just as he had run plump into a little man and nearly knocked him off the crossing. "Oh, you're excusable, sir. Don't mention it, but I'll have this thing fixed when the Legislature meets." "What'll you do then?" "I'll have these grade crossings abolished, sir."—*Hartford Post.*

Co-operation Between Railroads and the Navy.

As soon as we get over the rush we are going to invent a big navy gun that will throw deadly car stoves into the enemy's vessels. Two grand results will be accomplished. The enemy will be annihilated in a particularly melancholy manner, and we shall get rid of the car stoves.—*Springfield Union.*

Induced Combustion and Explosives.

A recent trial of an agent of a Berlin banking house in one of the Prussian courts for jeopardizing a railroad train brought out some interesting testimony about explosives.

The defendant had shipped 22 pounds of fuming nitric acid from Berlin to a point in Bavaria, *as clothing*, by passenger train, it having been refused as express freight. The acid was in a strong earthen jar, tightly closed by a stoneware stopper and cement, the whole packed with straw in a wooden box. During the journey the car was discovered to be on fire and as the fire was extinguished before much damage was done, an examination showed that the fire originated from the leaking acid which had come in contact with a roll of woolen cloth and set it on fire.

Dr. Jeserich, the expert chemist, who, by the way, was appointed by the court, testified that all woolen goods, and all hair of animals, horn, etc., have the property of igniting spontaneously when coming in contact with fuming nitric acid.

The British Wheat Crop.

Mr. J. B. Lawes, one of the very best authorities, thus closes his report on the English wheat crop of 1887: "It has ceased to be a question of any interest to the consumer whether the yield of the home crop is a few bushels per acre more or less. * * * During the 8 harvest years, 1852-3 to 1859-60 * * * nearly three-fourths of the aggregate amount consumed was of home growth and little more than one-fourth was derived from foreign sources, but during the 8 years 1878-9 to 1885-6 little more than one-third has been provided from the home crop, and nearly two-thirds by imports."

The Red River Road in Manitoba.

It is said that Messrs. Norquay and Hamilton will go to England in the interest of the Manitobans, and with reference to an appeal to the Queen-in-Council. Mr. Goldwin Smith, in writing of such an appeal said: "If the province makes good its case, the Crown should be advised to restrain the Governor General in the exercise of his veto. A just act of the Manitoba legislature authorizing the construction of the Red River Valley Railway would then be passed, and would not be disallowed. The Judicial Committee of the Privy Council would not be able to go beyond the veto, the strict legality of which is indisputable, to the point of constitutional right; but this might be done by a mixed committee of jurists and statesman," and quotes a precedent for his opinion.

Another method of dealing with the difficulties is also in progress. The inter-provincial convention just closed at Quebec is said to have passed a resolution, which will be submitted to the provincial legislatures, that the veto power of the Dominion government should be abolished and legislative acts of the provinces be submitted on appeal to such an independent authority as the Supreme Court.

To Asia by the Canadian Pacific.

The Canadian Pacific as a short route to the east naturally excites considerable interest in Great Britain. One English traveler writes: "The time-table published by the Canadian Pacific allows 5 days and 22 hours local time (6 days 1 hour real time) for through journey from Quebec to Vancouver, but the trains are very often late. This defect will, no doubt, be rectified, and I will suppose that the journey may be done in 5 days."

He estimates the time by the several routes from England to Japanese, Chinese and Australian ports via Quebec, and the Canadian Pacific, via Gibraltar and Suez, via Brisbane and Suez and via the Cape, and makes the Canada route

shorter by about 17 days to Yokohama, 7 days to Shanghai and two days to Sidney, Australia; and he declares that he has no prejudices for the latter route, but all his prejudices, wishes and interests go the other way.

Notes.

An attempt was made to wreck the mixed train going west on the St. Johnsbury & Lake Champlain road on Oct. 28 between Hardwick and Morrisville, Vt., by spiking a cross-tie to the track.

M. W. Hullivan, night operator at Thompsonville, Conn., on the New York, New Haven & Hartford road, found a block of granite weighing about 1,500 pounds, on the track, over which an express train was about to pass. He flagged the train and also two others before the stone could be moved. It took seven men to do it. The stone probably fell from a freight train.

On the morning of Oct. 28 an attempt was made near Morris, Ill., to wreck the Kansas City passenger train on the Chicago, Rock Island & Pacific. Instead of the expected train a freight ran into the obstruction, which was a telegraph pole placed with the butt end towards the locomotive. The train was a complete wreck, and the engineer and firemen were both killed outright. Large rewards are offered by the company for the capture of the wreckers.

Railroad Construction in Dakota for 1887.

The Department of State of Dakota has issued its report of railroad building for nine months of 1887. It shows a total new mileage of 717 miles. The companies which have built most largely are the following: Northern Pacific, Grand Forks to Pembina, 95 miles; St. Paul, Minneapolis & Manitoba, Minot west, 150; Rugby Junction to Bottineau, 40; Park River to Langden, 40; Rutland to Ebendale, 40; Minnesota Line to Watertown, 41; Chicago, St. Paul, Minneapolis & Omaha, Salem to Mitchell, 33; Chicago, Milwaukee & St. Paul, Bristol to Lake Preston, 75; Chicago & Northwestern, Faulkton to Gettysburg, 44; Vordon to Groton, 14; Fremont, Elkhorn & Missouri Valley, Rapid City to Sturgis, 25; Minneapolis & Pacific, Ransom to Monage, 53.

The Price of Coal.

The Philadelphia & Reading has made another advance in prices, which will go into effect next month. Broken will be sold at $2.85; egg, $3; stove, $3, and chestnut, $3—an advance of 25 cents all around. These prices refer only to the line and Philadelphia trade. No advance has been made in New York and Eastern rates. A Reading Railroad official said that the advance was made on account of the scarcity of coal. The company is overwhelmed with orders, and has been unable to fill them. For several weeks past all orders have been taken subject to next month's prices.

The strike in the Lehigh region still continues, and the officials of the Lehigh Valley road and Lehigh Coal and Navigation companies say that the situation is unchanged. They are averse to advancing the price of coal, and therefore cannot afford to pay the men the wages which they demand. If they are willing to work under the old schedule the companies will take them back

An Accident Room in Boston.

The New York & New England, Old Colony and Boston & Albany railroads have appointed Dr. George N. Galvin, of the United States Hotel, surgeon for the above corporations, and at the hotel the railroads have equipped a room similar to an accident room of a large hospital, to be known as the railroad accident room. The surgeon is to be on duty at all hours, and the expense for surgical attendance to employés or patrons of the road is to borne by the railroads. The United States Hotel being in the immediate vicinity of three of the largest railroads, makes it of great convenience to those requiring the services of a surgeon. The great distance to the hospitals, and unavoidable waits before receiving attention, prompted the railroads to adopt this plan. In cases of severe accidents, the employés have the privilege of receiving home treatment from the surgeon in charge. This room is so thoroughly equipped that, in case of a severe casualty out of town, a full supply of surgical appliances can be obtained at a moment's notice.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In Louisiana, the Supreme Court says that the franchises of a railroad corporation are rights or privileges which are essential to the operations of the corporation, and without which its roads and works would be of little value; such as the franchise to run cars, to take tolls, to appropriate earth and gravel for the bed of its road, or water for its engines, and the like. Such franchise includes the right of appropriating lands for the construction of necessary appurtenances without which the road could not be successfully operated. Such a franchise is transferred, in a marshal's sale of a railroad and all its franchises to the purchaser.[1]

In Georgia, a statute authorized the connection of the Muscogee Railroad with the Opelika Branch Railroad and the Mobile & Girard Railroad at Columbus, by extending their roads through the city commons and streets, with such sidetracks, turn-outs and sheds as might be necessary for the convenience of freights and passengers, provided they first obtained the consent of the people of the city upon such terms as might be agreed on and should be satisfactory to them. The municipal authorities, by resolution, proposed to the people to vote "connection" or "no connection," only submitting the question of allowing a connection by a single track, and the vote was in favor of "connection." The Supreme Court decides that this action, without more, did not authorize the laying of side tracks in the street. Nor could the mayor and council, without further authority, grant such power.[2]

In Kentucky, the Court of Appeals declares that a company chartered to build a "railroad" merely has the right to elevate it above the surface wherever the character of the country makes it either essential or convenient, although the word "elevated" may not occur in the charter, or the right to elevate it may not be expressly granted.[3]

In Iowa, a town railroad aid tax was declared illegal. Prior to this the tax had been collected, and paid in part to the railroad company; but part of it still remained in the hands of the treasurer. The Supreme Court holds in a suit against the county by a property holder who had paid his tax, asking for a judgment and an order for the payment of the amount of his claim out of the unexpended money in the county treasury, that he was not entitled to the relief asked, and that his remedy was by *mandamus*.[4]

Carriage of Goods and Injuries to Property.

In Arkansas the Supreme Court (June 25, 1887, L. R. & F. S. R. R. *vs.* Hanniford) holds that the act of February, 1885, prohibiting railroads in the state from charging a greater sum for the transportation of freight than is specified in the bill of lading, and imposing a penalty for refusing to deliver goods on tender of charges due as shown by the bill of lading, is general and uniform in its operation and therefore within the constitutional limit. It is also held that the act is within the police power of the state and therefore not in conflict with the Inter-state Commerce act. Where weight is not shown in the bill of lading the specifying of the charge per hundred pounds is sufficient within the intent of the law, and the sum due is shown with sufficient clearness, provided the weight is readily ascertainable. In this case the railroad appears to have attempted to collect more than the just amount of charges by claiming the right to charge the agreed rate upon an excess of weight on the technical ground that the weight was not given in the bill of lading.

In Indiana, it is held by the Supreme Court that an abutting lot owner whose title extends at most to the middle of the highway, 40 ft. in width, cannot maintain an action for damages for an unlawful obstruction 11 ft. in width, on the opposite side, the only effect of which is to render access to his property more difficult and inconvenient, and to force the travel nearer to his lot.[5] In the same state, the Supreme Court rules that where the owner of a lot fronting on a street had released to a railroad company the right of way for the use of one track in the street to the centre of the street, he cannot maintain an injunction to prohibit the company from constructing a switch by laying a track on the projecting ends of the ties on which the rails of the main track have been laid, 14 in. nearer to his lot than the nearest rail of the main track, unless it appear that the laying of the proposed switch will, in some way, impose a burden on the plaintiff's soil which was not occupied by the track as it was located and used at the time the release was made; or that it in some way obstructs or impairs the plaintiff's use of the street, in a manner different from the obstruction occasioned by the main track.[6]

In Maine, the Supreme Judicial Court reiterates the principle that the construction and operation of a street railroad in a street is not a new and different use of the land taken for the street, entitling the adjoining owner to damages.[7]

A Texas statute provides that every railroad company shall be liable to the owner for any stock killed or injured by the locomotives and cars of the company in running over their respective railroads, unless the track is fenced. The Supreme Court rules that a railroad company is not liable, under the statute, for an injury to an animal caused by the animal running on the track through fright at the train, and being injured on a trestle, and not by contact with the locomotive or cars.[8] In another case in the same state, the Supreme Court holds that this statute does not apply to such places as public necessity or convenience require should be left unfenced, such as the streets of a city or town, the depot or contiguous grounds. When, however, an injury occurs within the limits of a town or city, the burden of proof rests with the railroad company to show that the place at which the animal entered was one which, under the law, it was not permitted to fence. Evidence is admissible to show that stock was not permitted, under the law, to run at large in the town where the killing occurred. Where there is such a law, the railroad company is liable only for gross negligence in killing stock. Where the railroad on which the killing occurred was owned by one company, and leased to another, without special authority from the state, both companies are liable to the owner of the stock, the one because of its actual operation of the road, and the other because it could not, without permission of the legislature, transfer its franchise even temporarily so as to release itself from liability for the acts and defaults of its lessee." In Iowa, the plaintiff claimed that the railroad had injured his horse by failing to fence its track, whereby it was driven by one of its trains into a cattle guard. The only evidence was that the tracks of three horses, one of which was the horse injured, showed that they were "going fast" on the right of way, before the cattle-guard was reached and afterwards, and that, during the night in which the accident occurred, a train passed over the road. The Supreme Court holds that the presumption that the horses were frightened by a train is a mere surmise, and a verdict for the plaintiff cannot be sustained.[10]

Injuries to Passengers, Employes and Strangers.

In Arkansas, a passenger sued a railroad for injuries received while alighting from the train. The Court on the trial stated the law of the case to the jury in these terms: If the plaintiff purchased a ticket to a regular station on defendant's road, and entered its train for the purpose of being carried there, and that, by reason of the failure of the conductor of said train to keep the cars at a stand-still a reasonable length of time to enable plaintiff to leave the cars in safety, the plaintiff was injured, without negligence on his part, the defendant is liable therefor; that if said train, after stopping at said station, started before the plaintiff could alight, and plaintiff, obeying the conductor's orders, attempted to get off while the train was going slowly, and the danger was not apparent, he was not guilty of such contributory negligence as would bar a recovery; that, if the plaintiff was directed by the conductor or agent of the defendant to get off while the train was moving, he had a right to rely upon said direction, provided he took no more risk than a prudent man would have taken under the same circumstances, and in so doing he would not be guilty of contributory negligence; and that where the danger of alighting from a moving train is not apparent to a passenger, and he is urged to take the risk by the company's employé, whose duty it is to know the danger, his conduct is not negligent. The jury found a verdict in favor of the plaintiff, which the Supreme Court affirms on appeal.[11]

In Texas, the conductor of a train told a female passenger that she had ten minutes in which to check her baggage. Before the expiration of that time the train started and in attempting to board it she was injured. A verdict against the company is sustained by the Supreme Court.[12]

In Texas, one G. leased ground from a railroad company adjoining its depot, and erected and maintained thereon an eating-house, to which the company's employés and passengers frequently resorted for refreshments. In an action against G. and the company for injuries caused by a defective platform erected by G. in front of the eating-house, and on the leased premises, the Supreme Court holds that, in the absence of evidence that the eating-house was managed or controlled by the company, the mere fact that it owned the ground upon which it was erected, and that the company's interests were subserved by having such eating-house near its depot, imposed no duty upon the company to keep in repair or well lighted the platform upon which the injury occurred, or a passage-way leading to it from the depot.[13]

In Texas, the Supreme Court holds that a verdict $5,000 given to a woman of 50 who has lost the free use of one her arms, has had her shoulder and spine injured so as to produce great pain, and whose general health has been rendered bad will not be set aside as excessive.[14]

In Michigan, a person was killed by a train while crossing the tracks over the main street in a village of about 4,000 inhabitants. At the time of the accident he was driving slowly in a democrat wagon, drawn by a mule which was so slow and lazy that it was a common practice to joke about the mule, and tell his driver to whip up. When about to cross, persons who saw the train coming called to the deceased to whip up, but it did not appear that he understood that the train was approaching. The deceased looked and listened as he drew near the crossing, but did not stop. The train that killed him was two hours late, and was running from 25 to 40 miles an hour. There was no flag-man at the crossing, and the view was obstructed by coal-bunkers and standing freight cars. There was a preponderance of evidence for the plaintiff that no bell was rung or whistle sounded. The Supreme Court holds the railroad liable, and lays it down that where it is the custom of a daily train to sound a whistle and ring a bell when approaching a certain street crossing, a person driving in a wagon along the steet, two hours after the schedule time of the train, is not bound, because the track at the crossing is obstructed so that he cannot see beyond, to get down from his vehicle, and go to a point where he can see before driving over the crossing; if he looks and listens carefully, that is all that can be required of him under such circumstances.[15]

In Missouri the Supreme Courts holds that an unblocked guard-rail is not an appliance so dangerous as to threaten immediate injury to those who work about it, and the fact that a yard-master knew that the rail was not blocked, and continued to pursue his employment of cutting out cars on that track, will not defeat a recovery on the part of his representatives, when, at the time he got his foot caught and was run down, he was in the exercise of all due care and proper caution. When it is clear from the testimony that the blocking of guard-rails adds to the security of the employés, and it is in proof that the company has made use of them on some parts of its road, a verdict against the company for damages resulting from the death of one of its yard-masters, who got his foot caught in an unblocked guard-rail and was run down, this is evidence of negligence in the particular case on the part of the company.[16]

In Wisconsin, the Supreme Court rules that a station agent who, by the rules of a railroad company, is held responsible for the safety of switches, and whose express duty it is to see that the main track is kept clear and unobstructed for the passage of trains, or to give timely notice to those in charge of approaching trains, and be out at the station, and know that everything is right when trains are passing, is a "fellow-servant" of a brakeman, in the employ of the same company, who has been injured by a collision near such agent's station.[17]

In the same state, while the brakemen of a freight train were switching some cars on to a side track, the train on the main track started on the down grade, collided with the other cars, and killed a brakeman. The conductor was in the station at the time, attending to business, and the evidence showed that he could not possibly have stopped the train after it started. The presumption being that the brakeman set the brakes, and there being no evidence that the conductor set them or knew that they were improperly set. The Supreme Court holds that he was not guilty of negligence in not watching or stopping the train.[18]

In Iowa, a car of dynamite standing in the yard of a railroad company awaiting the orders of its owner, took fire and exploded. Plaintiff sued for damages for the consequent injury to her property, averring that the dynamite was not properly protected; that the fire had caught from passing engines; and that the car was negligently permitted to stand in an improper place. At the time of the fire the car stood on the outer track at the south side of the yard, and the wind was blowing from the south. There was no evidence that the fire had caught from passing engines, or that they were defective in their machinery to prevent fire escaping therefrom. There was no evidence that the dynamite was not properly protected, nor that the damage would have been less if the car had been standing at any other place in the yard. The Supreme Court decides that the railroad is not liable.[19]

[1] Lawrence v. Morgan's L. & T. R. & S. S. Co., 2 South. Rep., 39.
[2] Kavanagh v. Mobile & G. R. Co., 2 S. E. Rep., 636.
[3] Bulton v. Short Route R. Co., 4 S. W. Rep., 332.
[4] Everly v. Jasper Co., 33 N. W. Rep., 609.
[5] Indiana, B. & W. R. Co. v. Eberle, 9 West. Rep., 206.
[6] Indianapolis & St. L. R. Co. v. Calvert, 9 West. Rep. 238.
[7] Briggs v Lewiston & Auburn R. Co., 4 New Eng. Rep., 546.
[8] International & S. N. R. Co. v. Hughes, 4 S. W. Rep., 49?.
[9] Mo. Pac. R. Co. v. Durham, 4 S. W. Rep., 472.
[10] Moore v. Burlington & W. R. Co., 33 N. W. Rep., 371.
[11] St. Louis, I. M. & S. R. Co. v. Person, 4 S. W. Rep., 754.
[12] Tex. Pac. R. Co. v. Davidson, 4 S. W. Rep., 636.
[13] Tex & Pac. R. Co. v. Mangum, 4 S. W. Rep., 617.
[14] Tex. Pac. R. Co. v. Davidson, 4 S. W. Rep., 637.
[15] Juggenheim v. L. S. & M. S. R. Co., 33 N. W. Rep., 161.
[16] Huhn v. Mo. Pac. R. Co., 4 S. W. Rep., 937.
[17] Toner v. Chicago, M. & St. P. R. Co., 33 N. W. Rep., 437.
[18] Brady v. Burlington, C. R. & N. R. Co., 33 N. W. Rep., 360.
[19] Walker v. Chicago, R. I. & Pac. R. Co., 33 N. W. Rep., 224.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings of the stockholders of railroad companies will be held as follows:

East Tennessee, Virginia & Georgia, annual meeting, at the office, Knoxville, Ten., Nov. 16.

Indiana & Western, at the office, Indianapolis, Ind., Nov. 10.

Manhattan, annual meeting, at the office, New York, Nov. 9.

Western, New York & Pennsylvania, at the office, Nov. 22.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Western Society of Engineers* holds its regular meetings at its hall, No. 15 Washington street, Chicago, at 7:30 p. m., on the first Tuesday of each month.

The *New England Railway Club* meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.

The *Boston Society of Civil Engineers* holds its regular monthly meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday of each month.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, on the third Thursday of each month.

The Western Railway Club meets in Chicago the third Wednesday in each month.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

New York, Boston & Providence, quarterly, 2½ per cent.
Pennsylvania, semi-annual, 3 per cent., payable Nov. 30.

Engineers' Club of Philadelphia.

A regular meeting was held Oct. 15, 1887.

Mr. A. Marichal presented a description of the Gileppe Dam, Belgium, illustrated by photograph and drawings, and followed by a discussion having for its object to prove that a saving of 50 per cent. of masonry could have been effected, together with an increase of stability, by adopting a profile taken from his "Diagram for the Construction of Reservoir Walls," presented to the club on May 21, 1887. The Gileppe Dam was completed in 1879. The object of its construction was to supply the city of Verviers with water. The capacity is 3,173 million gallons. The dam is 49.2 ft. wide at the top and 216 ft. at the bottom; its total height is 156.6 ft. At the top the dam is 771 ft. long and at the bottom 269 ft. It is built of rubble masonry, weighing 1¾ tons per cubic yd.

Mr. A. Saunders Morris presented notes upon "Connections for Secondary Batteries."

The Secretary presented, for Mr. W. H. Nauman, a de-

scription of Tests for Riveted Joints, made at Watertown Arsenal, Massachusetts, for the Bureau of Steam Engineering, September, 1886, accompanied by very complete drawings and tables.

Mr. Henry Roeske, of Philadelphia, introduced by the Secretary, presented an illustrated description of a system of water filtration devised by him. He preceded this description by a historical sketch of the filtration of water, and the various principal devices which have been used for the purpose of accomplishing it. Mr. Roeske's filter consists of a series of compartments so arranged that a large excess of water can be used for agitating and cleansing the filtering material in each compartment separately, while the rest of the compartments are furnishing a continuous supply of filtered water. The material in each compartment is designed to be cleansed at intervals of hours or days, as may be desired, by the action of automatic valves, which are operated by a lever, formed of pipe which fills with water at the designed intervals, and by its thus increased weight operates the valve. Sand and coke are the materials used. They are placed in separate compartments, the design being to protect the coke from the coarser impurities, so as to lengthen the time of its use. It is intended that the coke be used also as fuel after removal from the filter.

Locomotive Engineers.

The Brotherhood of Locomotive Engineers concluded their business in Chicago on Nov. 1. The next annual session of the Brotherhood will be held in Richmond, Va., on the third Wednesday in October, 1888.

New England Railroad Club.

The regular monthly meeting of the club will be held on Wednesday, Nov. 9, 1887, at 7:30 p. m. Subject for discussion, "Material for Axles, Journal Bearings and Lubrication."

American Society of Civil Engineers.

At the regular meeting of this society, Nov. 2, the ordinary business was transacted, tellers were appointed to canvass the ballot and the minutes of the meetings of Oct. 5 and 19 were read. The following persons were declared elected: *Members:* George Earl Church, Henry Stevens Haines, David Carlisle Humphreys, William Datus Kelley, Jr., Rowland Robinson, Minturn James Moylan, Cornelius Palmer, William Barclay Parsons, Edward Fesser Playle, Albert Fowler Robinson, Orlando Belina Wheeler. *Associate:* Arthur James Moxham. *Juniors:* Archie McLean Hawks, Downing Vaux.

The Nominating Committee, Messrs. Wm. H. Paine, Clemens Herschel, Fred Graff, Robert E. McMaite and Charles H. Latrobe, presented the following nominations:

For President, Thomas C. Keefer, of Ottawa, Can.

For Vice Presidents, J. J. R. Croes, of New York; Robert Moore, of St. Louis.

For Secretary, John Bogart, of New York.

For Treasurer, Geo. S. Greene, Jr., of New York.

For Directors, Mendes Cohen, of Baltimore; Jos. M. Wilson, of Philadelphia; Stevenson Towle, of New York; Charles B. Brush, of New York; Aiphonse Fteley, of New York.

The Secretary announced the death of Mr. Frederick W. Vaughan and Mr. Eugene F. Falconnet, members of the society.

The final report of the Committee appointed as to adding a new grade of membership to the society was read by the Secretary.

Mr. J. C. Davis announced that the Committee appointed to draft an amendment to the Constitution in reference to methods of election were not ready to make a report. That, owing to the fact that the amendments offered in the report of the Committee on Student Grade covered the same clauses in the Constitution, it was very difficult to frame an amendment which would not interfere with those already proposed, so that the matter would have to lie over.

The Secretary announced that he was requested to read the following proposed amendment:

Amend Article XVIII. of the Constitution by inserting after the word acceptance in the third line the following: But the proposals for admission to the Society of Engineers not resident in North America, and who may be so situated as not to be personally known to five members of the society, may be indorsed for ballot by five members of the Board of Directors, who shall for such purpose secure evidence sufficient in their opinion to show that the candidate is worthy of acceptance.

Also a proposed amendment to Article XIX., by adding "the Board of Direction, upon receipt of letters from not less than eight members in good standing requesting the reconsideration of the proposal of any rejected candidate, and stating the reasons for the request, may, if it considers the reasons to be sufficient, order a new ballot to be taken." * * * This ballot to be an open ballot, and five negative votes to exclude the candidate.

The Secretary read the resolution fixing annual dues for associate members and students.

Resolution fixing Entrance Fee and Annual Dues for Associate Members and Students:

Rsolved, In the event of the society adopting amendments to the Constitution creating the grades of associate members and students of the society, that the entrance fee and annual dues of associate members shall be the same as establishsd for associates; for students no entrance fee shall be required, and the annual dues shall be, for resident students, $10 and for non resident students $6 per annum.

An amendment was also offered that members should be elected by the Board of Direction by an affirmative vote of two-thirds thereof. In case of non-election of any person balloted for no record to go upon the minutes.

The paper of the evening on "Replacing the Stone Towers of the Niagara Suspension Bridge with Iron Towers" was then read by the author.

PERSONAL.

—C. F. Meek has resigned the Superintendency of the Des Moines Division of the Wabash Western.

—Albert Fink, Trunk Line Commissioner, arrived in New York from Europe, on Oct. 28, after an absence of three months.

—A. S. Winslow this week resigned the Presidency of the Cincinnati, Hamilton & Dayton. He explains that he only accepted the office on the condition that he was to serve temporarily.

—Mr. Thomas Shaw, M. E., of Philadelphia, has received from the Franklin Institute the Elliott Cresson Medal for his system and apparatus for automatically testing mine gases and for signaling in mines. The award was announced at the meeting of Oct. 19.

—Frederick W. Vaughn, C. E., died at his home in Louisville, Ky., on Oct. 19. At the time of his death he was President of the Louisville Bridge & Iron Co., and Consulting Engineer of the Louisville & Nashville road, having held the latter position for a number of years. He was 48 years of age.

A. K. Mansfield has removed his headquarters from Chicago to New York, where he will continue his business as mechanical engineer, in company with Mr. George L. Mansfield, the firm name being A. K. Mansfield & Co. Mr. Mansfield was formerly Superintendent of Motive Power of the New York & New England road.

—E. G. Squire, late chief of the car service department of the Chicago, Burlington & Quincy, died at La Grange, Ill., last week. Mr. Squire had been in poor health for some time. He was one of the best qualified men in his department in this country and his counsels have given much value and weight to the work of the Car Accountants' Association.

ELECTIONS AND APPOINTMENTS.

Atlantic & Danville.—Thomas Ewing has been elected President in place of B. T. Tillar, deceased.

Boston & Albany.—William R. Robeson, Jr., has been appointed Division Superintendent at East Albany, N. Y., in place of Wm. H. Russell, Jr., resigned.

Hamilton Perkins has been appointed Assistant General Freight Agent, office at Boston.

Central, of Georgia.—C. E. Marvin has been appointed Road Master of the Main Stem and branches, vice W. M. Stevens, resigned.

Chesapeake & Ohio.—W. C. Wickham has been appointed Receiver.

Chicago, Burlington & Quincy.—C. C. Upham, for many years Chief Engineer of the Chicago, Burlington & Northern, has been appointed Superintendent of the Illinois lines of this company, vice C. F. Resseguie, with headquarters at Galesburg, Ill.

L. N. Hopkins has been appointed Assistant Paymaster.

Chicago, Santa Fe & California.—W. P. Moore has been appointed Agent at the Chicago station and D. Howard Assistant Agent.

Cincinnati, Hamilton & Dayton.—Julius Dexter has been elected President.

Cincinnati, Indianapolis, St. Louis & Chicago.—G. W. Bender has been appointed Superintendent, vice J. W. Sherwood, resigned.

W. C. Hobbs has been appointed General Agent at Kansas City.

Cincinnati, Jackson & Mackinaw.—The offices of Auditor Ohio Division and Acting Auditor and Cashier Michigan Division have been abolished. G. H. Wappner is appointed Auditor, with office at Van Wert, O. O. A. Wilson is appointed Cashier, with office at Toledo, O.

Danville & Seaboard.—The company organized this week by electing Major W. T. Sutherlin President, and J. D. Blair, F. X. Burton, J. G. Henn, J. H. Schoolfield and M. P. Jordan directors.

Dubuque & Northeastern.—The incorporators of this Illinois company are: Bluford Wilson, F. H. Jones, Samuel Dresser, T. McGrath, H. A. Stevens.

Dubuque & Southwestern.—The incorporators of this Illinois company are: Bluford Wilson, F. H. Jones, Samuel T. Dresser, T. McGrath, H. A. Stevens.

Fort Worth & Denver City.—C. F. Meek has been appointed General Manager of this road, the Denver, Texas & Gulf, and the Denver, Texas & Fort Worth, which are to be operated as one line.

Grand Rapids & Indiana.—E. J. Keate has been appointed General Agent at Grand Rapids, Mich.

Hawesville & Pellville Mineral.—D. L. Adair, of Hawesville, Ky., is President.

Indianapolis, Decatur & Springfield.—C. E. Boyle has been made Superintendent, succeeding George Bender.

Kansas City, Fort Scott & Gulf.—A. J. Vallandigham has been appointed Assistant General Freight Agent, with office in Kansas City, vice J. V. Parker, resigned.

Louisville, Cincinnati & Dayton.—The following directors were elected this week: George A. Evans, Austin Gallagher, Joseph Pennington, George C. Evans, of New York; J. P. Helm, J. R. McCracken, J. C. Fawcett, of Louisville; Chas. A. Korbly, of Madison, and Chas. E. Golay, of Vevay. The directors will meet in Louisville to organize.

Milwaukee, Lake Shore & Western.—George S. Marsh has been appointed General Passenger Agent.

Minnesota & Northwestern.—Wilbert Irwin has been appointed Superintendent of the newly-established Dubuque Division.

Charles B. Gregory has been appointed Trainmaster of the Chicago division, with office in Chicago.

New York, Lake Erie & Western.—W. W. Brace has been appointed Chief Train Dispatcher of the Rochester Division. W. J. Hall has been appointed Train Dispatcher on the Buffalo Division.

Palatka, Lake Harris & Gulf.—The incorporators of this Florida company are J. A. Larned and O. W. Bromwell, of Palatka, and William B. Hayes, of New York.

Pennsylvania Company.—James McCrea has been elected Fourth Vice-President and General Manager, with office at Pittsburgh. Joseph Wood has been appointed General Superintendent of Transportation, and in the absence of the General Manager will act for him, with office at Pittsburgh. The General Freight Agent, the Manager of the Union Line, the General Passenger and Ticket Agent, and the General Superintendent of Transportation will report to the General Manager.

The following appointments have been made: Reuben F. Smith to be General Agent of the Cleveland and Pittsburgh Division, with office at Cleveland, O.; Edmund Yardley to be Superintendent of Transportation, with office at Pittsburgh, Pa.; F. D. Casanave to be Superintendent of Motive Power, with office at Fort Wayne, vice Joseph Wood, promoted; George L. Potter to be Master Mechanic of Fort Wayne Shops, vice F. D. Casanave, promoted.

David S. Gray has been appointed General Agent of the Pennsylvania Company and Manager of the Union Line, with his office at Columbus, O.; F. H. Kingsbury, Eastern Superintendent, with office at New York, and E. A. Dawson, Western Superintendent, with office at Chicago.

Pittsburgh, Marion & Chicago.—The office of Superintendent has been abolished, the duties of Superintendent will hereafter be performed by the General Manager, and to this latter position N. F. Wood has been appointed, vice C. De Clark, resigned. Office at New Lisbon, O.

Seattle, Lake Shore & Eastern.—The following directors have been elected: Thomas T. Miner, F. H. Osgood, L. C. Gilman, F. H. Whitworth, John Leary, R. W. McPhadden, H. Chapin and J. R. McDonald, of Seattle; S. V. White and Jameson, of New York; T. N. Logan, of Richmond, Va.; J. W. Butts, of Providence, R. I., and C. E. Curry, of Boston, Mass.

Seymour & Southwestern.—The directors of this Indiana company are Louis Schneck, F. M. Swope, R. F. White, A. P. Charles, Leonard Hibner, M. S. Blish, John Humes and G. F. Harlow, of Seymour; C. L. Wayman and T. B. Boyatt, of Brownstown, and Samuel T. Wells, of Vallonia. The officers are: President, F. M. Swope; Vice-President, S. T. Wells; Secretary, Louis Schneck; Treasurer, Lyun Faulkioner.

Texas & Pacific.—C. H. Mead has been appointed Master Car Builder. Office at Marsball, Tex.

Valley, of Ohio.—E. C. Janes has been appointed Passenger Agent with headquarters at Akron, O.

Wabash Western.—The jurisdiction of H. L. McGee, Superintendent, headquarters at Moberly, Mo., has been extended to include the lines from Ottumwa to Des Moines and Albia to Harvey, Ia.

Wisconsin Central.—J. B. Wickery has been appointed Contracting Agent at Chicago, vice F. H. Fogarty, promoted.

OLD AND NEW ROADS.

Arizona Mineral Belt.—The company has commenced suit in Boston against the Atlantic & Pacific for breach of contract. Damages are laid at $700,000.

Atchison, Topeka & Santa Fe.—Work on the new line eastward from Fort Scott, Kan., through the state of Missouri, was to have begun this week. Just what connection will be made on the eastern end of the line has not been given out.

The cars are running from Los Angeles, Cal., to San Juan on the coast. Work has begun on the line from Los Angeles to Anaheim.

Beech Creek.—It is stated that the company, in view of the increased demand for coking coal for iron manufacture, intends building another extension in the Clearfield coal region.

Boston & Maine.—Governor Sawyer, of New Hampshire, this week vetoed the bill authorizing this company or the Boston & Lowell to lease the Northern Railroad, and, if leased by the Boston & Lowell, permitting the Boston & Maine to guarantee and assume the covenants of said lease. The Governor has signed the bill to ratify the lease of the Manchester & Lawrence road to the Boston & Maine.

The New Hampshire Senate has passed the bill authorizing the Boston & Maine to purchase the property and franchise of the Eastern road in New Hampshire.

Brainard & Northwestern.—The engineers running the survey from Milaca to Leech Lake, Man., have completed their work.

Buffalo, Rochester & Pittsburgh.—At a special meeting this week a new mortgage of $10,000,000 was authorized, $6,000,000 of which is to be reserved to take up the present consolidated mortgage of $6,000,000, and $4,000,000 to be raised for extensions now projected, rolling stock and general purposes.

California Central.—This company's freight depot at Los Angeles, Cal., a building over 600 ft. long, was completely destroyed by fire on Oct. 28. It was full of freight. About 20 freight cars, 4 Pullman and several passenger cars were burned.

Carolina, Knoxville & Western.—Last week the county of Knox, Tenn., voted $100,000 in stock to this company.

Caves & Worthington Valley.—It is proposed to organize this company to extend the Green Spring branch of the Northern Central, which now extends from Hollins to Green Spring Junction, Md., 8½ miles.

Central Massachusetts.—It is said that work on the Holyoke branch will be commenced as soon as the main line to Northampton is completed.

Chattanooga, Rome & Columbus.—It is reported that the Rome and Carrollton Construction Co. has let the contract to build 100 miles of this road to Lee, Garsey & Underdank.

Chesapeake & Ohio.—The company has contessed judgments in favor of C. P. Huntington for $1,772,976. Mr. Huntington has filed a bill in chancery against the company, claiming that it is insolvent and praying for the appointment of a receiver. The Court appointed W. C. Wickham.

Chicago, Burlington & Quincy.—The track is laid to within 50 miles of Cheyenne, Wy., and trains will be running to that place by Dec. 1.

Chicago, Kalamazoo & Saginaw.—A section of this new road between Kalamazoo and Hastings, Mich., 31 miles, is completed and in operation. The directors decided last week to build the line from Hastings to Saginaw, 95 miles, and from Kalamazoo to the Grand Trunk road, 22 miles, at or near Marcellus, Cass County. The survey of the first section will begin at once.

Chicago, Milwaukee & St. Paul.—The survey was begun last week from Knowlton to Berlin, Wis. This line when completed will give the company a short line from Milwaukee to Lake Superior.

The Kansas City line was completed on Nov. 1. The first train was run on Nov. 2.

Chicago, St. Paul & Kansas City.—The track of the Kansas City extension of this road is now laid 75 miles out from Des Moines, Ia., to Knowlton.

Cincinnati, Jackson & Mackinaw.—Tracklaying on the Northern Extension is completed to West Unity, O., and nearly to Waldron, Hillsdale County, Mich.; and the work goes on as fast as the rails are received from the mills. At the southern end of the line the work also progresses as fast as possible. The piers for the iron bridge across the Miami between Carlisle and Franklin are nearly ready for the superstructure.

Cincinnati Southern.—A force of 500 hands has commenced work on the connecting link between Clinton and Oliver Springs, Tenn., a distance of 12 miles, through a very wild mountain district. The grading is to be completed by Jan. 1, and trains are to be running by March 1. This will connect the East Tennessee, Virginia & Georgia with the Cincinnati, New Orleans & Texas Pacific at Knoxville Junction, Tenn.

Clearfield & Jefferson.—Tracklaying on the new extension from Mahaffey to Horatio, Pa., on the Mahoning River in Jefferson County, was completed on Oct. 28 as far as Clayville, 20 miles from Mahaffey. The balance of track to Horatio, where coal mines are being opened and coke ovens built, will be completed about Nov. 15, and it is expected the road will be opened at about that time. The South Witmer branch, extending from Irvona westward to

the Frankhurst Wister mines, 2½ miles, is completed. At Frankhurst mines 100 coke-ovens have been built.

Columbus & Western.—The track has been roughly put down from Goodwater, Ala., to a point 5 miles from Syllacauga. The entire force of tracklayers have been put on the work at Goodwater and will work westward, completing the track from there. It is probable that the road can be finished from Goodwater to Syllacauga by the middle of the present month.

Danville & Seaboard.—The incorporators met this week and paid in $10,000, as required under the charter. The road is projected to run from Danville, Va., to a connection with the Seaboard & Roanoke Air Line.

Davenport, Iowa & Dakota.—The contract has been let for building 10 miles of this proposed road from Davenport, Ia. This is to be completed by Dec. 1. The right of way is secured to Independence, and it is promised that trains will be running to that point within a year.

Delaware & Hudson Canal Co.—The reports of this system of railroads for the quarter ending Sept. 30 show that the earnings from operations, compared with last year, increased $92,758, while the net income fell off $109,348. The reports, in detail, are as follows:

ALBANY & SUSQUEHANNA AND BRANCHES, AND LACKAWANNA & SUSQUEHANNA.

	1886.	1887.
Gross earnings	$806,243.34	$844,017.66
Operating expenses	427,983.77	513,272.02
Net earnings	378,258.57	330,745.64
Charges	247,175.07	258,515.97
Net income	131,083.50	72,229.67

RENSSELAER & SARATOGA.

	1886.	1887.
Gross earnings	$774,004.48	$810,362.24
Operating expenses	359,131.70	449,485.89
Net earnings	414,872.78	360,876.35
Charges	267,253.45	265,863.71
Net income	147,619.33	95,012.64

NEW YORK & CANADA.

	1886.	1887.
Gross earnings	$237,289.59	$255,950.63
Operating expenses	129,112.68	147,814.68
Net earnings	108,176.91	108,135.95
Charges	68,363.89	66,209.74
Net income	39,813.02	41,926.21

Deming, Sierra Madre & Pacific.—The company has obtained a charter in New Mexico to build a road 40 miles in length, from Deming to a point in Mexico.

Denver & Rio Grande.—A route has been located for an extension of the road from Dallas to Rico, Col., by way of Telluride, Ames and Ophir.

Denver, Texas & Fort Worth.—R. S. Ryan and T. S. Pusey, of Trinidad, Col., have taken the contract to grade the line from Trinidad to the Texas border. The work is to be completed by Jan. 1.

Dubuque & Northeastern.—Incorporated in Illinois to build a road from East Dubuque, northward to a point in Jo Daviess County on the Illinois & Wisconsin state line, within one mile of the Mississippi River.

Dubuque & Southwestern.—The company has obtained a charter in Illinois to build a road from East Dubuque to or near Savannah, Ill. The business office will be in Chicago. Capital stock, $1,000,000.

Fort Worth & Denver City.—This company, the Denver, Texas & Gulf and the Denver, Texas & Fort Worth will from Nov. 1 be operated as one line from Denver, Col., to Fort Worth, Tex.

Fremont, Elkhorn & Missouri Valley.—The road has been opened from Fremont to Hastings, Neb., 164 miles from Missouri Valley and 631 miles from Chicago. The road is 126 miles long.

The company will establish a winter terminus on its Black Hills branch at Selbie, 10 miles north of Sturgis, Dak.

Georgetown Narrow Gauge.—The survey of the road is completed. It runs from Georgetown, Cal., to Pine Grove, and thence to a connection with the Central Pacific at Loomis. The length is about 37 miles, part in El Dorado and the remainder in Placer County.

Hawesville & Pellville Mineral.—Incorporated in Kentucky. The company intends building a road between the towns, and after its completion to Pellville it is hoped to extend it to Hartford, Ky., to a connection with the Chesapeake & Ohio.

Inter-state & Denver.—Charter filed in Kansas. The road is projected from Madison, Greenwood County, westward to Denver, an estimated length of 400 miles. Capital stock, $2,000,000. Headquarters at Marion, Kan.

Kansas City, Fort Scott & Gulf.—The directors of this road and those of the Kansas City, Springfield & Memphis have voted to recommend a consolidation of the two properties on the basis of share and share. The Kansas City, Fort Scott & Gulf operates 398 miles of road, and has a capital of $7,398,000, or about $19,000 per mile. Of the capital stock $2,750,000 is preferred, and $4,648,000 common. The Kansas City, Springfield & Memphis operates 282 miles of its own, and has $5,264,500 capital—a little less than $19,000 per mile.

Kansas City & Rich Hill.—The line will be immediately cross-sectioned from East Lynne to Rich Hill, Mo., and estimates will at once be made and contracts let.

Kansas City, Texarkana & Gulf.—The survey is completed from Texarkana to Locksburg, Ark., and contracts for 50 miles will be let this week.

Contracts are about to be let for 50 miles of road. C. C. Donian and Charles E. Bramble, of Texarkana, Ark., are directors.

Kansas City, Wyandotte & Northwestern.—The road was completed to Holton, Kan., from Kansas City, Mo., last week.

Kings County Elevated.—Henry W. Sage & Co. have begun proceedings against the company. The firm claims to have owned 800 shares of the original stock since 1883. It is alleged that the directors have entered into a conspiracy with Henry Bradlee, a contractor, to build the road as a syndicate and receive all the bonds and stock. They are thus to receive a large amount of the stock, securities, profits and issues of the company belonging in right to the stockholders. The court has granted an ex-parte order in the case to examine Edward A. Abbott and Harvey Farrington, directors, Henry J. Robinson, Secretary of the company and Bradlee, the contractor, in order that a complaint against the company may be framed.

Lake Shore & Michigan Southern.—The company will build a short branch from a point near Kendallville to Rome City, Ind.

Lancaster & Hamden.—Work was begun on this road last week at Lancaster, O., by the contractor, James H. Kyner. This week work will be begun at Tarlton, Oakland and Rock Cut simultaneously. Trains are expected to be running from Lancaster to Tarlton, 18 miles, by Jan. 1.

Lehigh Valley.—The company has ordered 2,000 new freight and coal cars.

Little Rock & Alexandria.—The proposition to give a 5 mills tax for ten years and 30 acres of land to this company was carried in Alexandria, La., last week by a unanimous vote.

Little Rock & Fort Smith.—It is stated that 11,000 tons of rails have been bought to complete the extension to the connection with the Missouri, Kansas & Texas in Indian Territory, and enough to finish the Missouri Pacific branch to Gurdon, Ark., between Fort Smith and Greenwood.

Louisville, New Albany & Chicago.—A portion of the Bedford & Bloomfield Division, which extends from Bedford to Switz City, Ind., 43 miles, was changed to standard gauge this week. The portion now left at narrow gauge will be changed early next spring.

Manhattan.—The company has complied with the order to remove all advertising signs from the railings on the elevated stations.

The new elevator for passengers who have been accustomed to climbing the 88 steps leading to the station at 116th street and Eighth avenue was opened to the public on Nov. 3. There are four passenger elevators in the new building, which occupies the southeast corner of the two streets, on a lot 25 ft. 11 in. by 18 ft. in size. The building is 80 ft. high, and the elevators leave passengers at a level slightly below that of the roadway, under which they will then pass and ascend only 15 steps to the station platform. The building is owned by the Central Park Improvement Co., and leased to the Manhattan.

Memphis & Charleston.—Leopold Sigmund and Abraham Friedenburg, of New York, have begun suit in Huntsville, Ala., against this company and the East Tennessee, Virginia & Georgia to enjoin the former from permitting the latter to vote 106,261 shares of the Memphis & Charleston stock at the election to be held Nov. 17 in Memphis and Huntsville. It is charged that the control of these shares was obtained in an illegal manner.

The company will extend its lines from Birmingham to Scottsborough, Ala.

Mexican Central.—The contract for the grading and masonry work on the Tampico branch of this road between Aguas Calientes and San Luis Potosi is let to Stephen Heaton. He will commence work immediately with 1,400 men. The engineers have completed their work on the branch and everything is ready for active construction. McGaverock & Price, the contractors for the Tampico end of the branch, have a large force at work and are advertising for 8,000 additional laborers. The track on the Guadalajara branch is laid for 33⅓ miles and 32⅛ more are graded. The track goes down at the rate of about a mile a day.

Minnesota & Northwestern.—The company has established a new division, to be known as the Dubuque Division. It will include that portion of the line between Elma & Dubuque. Headquarters at Dubuque, Ia.

Mobile & Navy Cove.—The General Manager reports that the arrangements for building this Alabama road have been completed and that work will begin Dec. 1.

Napa & Humboldt.—A contract has been let to J. T. Davis to grade 20 miles of this road between Conn and Bull's canyons, Cal.

New Roads.—A contract for grading a road from Burnet, Tex., to Marble Falls, 15 miles, was let last week and work was begun on Nov. 1. The Texas Mining and Improvement Co. let the contract. It is understood that the Austin & Northwestern will equip and operate the road.

New York Central & Hudson River.—The company is having 400 stock cars equipped with air brakes at the Buffalo shops.

New York, Pennsylvania & Ohio.—The $30,000,000 suit brought against this company in 1881 by James McHenry and John Conybeare for themselves and other holders of certificates issued in exchange for bonds and shares of the Atlantic & Great Western, was ended in Cleveland, O., last week by the payment of the small amount of costs remaining.

New York & Rockaway.—The company has mortgaged its road to the Central Trust Co., New York, to secure the payment of $1,000,000, for which bonds of $1,000 denomination bearing interest at 5 per cent., running 40 years, will be issued.

Northern Pacific.—From Jan. 1 to Sept. 30, 1887, this company built 95 miles of road in Dakota, extending from Grand Forks to Pembina.

Orange Belt.—W. H. Veale and Mr. Varnedoe, of St. Augustine, Fla., have received the contract for grading the extension from Tarpon Springs to Petersburg, 17 miles.

Osgood & Greensburg.—A railroad is projected between these two Indiana towns, 17 miles.

Palatka, Lake Harris & Gulf.—The company has been chartered in Florida to build a road from Palatka to the Manatee River at Palmetto.

Pennsylvania.—At the meeting this week the directors declared a semi-annual dividend of 3 per cent. Nothing more than the usual dividend of 2½ per cent. had been expected. This action had a favorable impression on the stock, and it immediately advanced from 55⅝ to 56¼.

Pueblo & State Line.—This will be the name of the Missouri Pacific's line to Pueblo, Col., and it is to be completed in a few weeks. It connects with the main line at Ness City, Kan.

Red River Valley.—A dispatch from Winnipeg says that the reported arrangement made by the local government with H. P. Holt for the completion of the road, has undoubtedly fallen through. The citizens have decided that they cannot advance the $300,000 which was proposed the city should give to aid the enterprise.

Richmond & Danville.—The company will extend its line from Bridgewater to Linville Mountain, N. C.

Roanoke & Southern.—The road is projected to run from Roanoke, Va., to Atlanta, Ga., a distance of 550 miles. The preliminary survey is nearly completed from Roanoke to Salem, N. C.

Rome & Decatur.—Several of the principal creditors of the firm of Grovestein & Pell met in New York this week and passed a resolution to have the committee of the creditors finish this road, which is a portion of the assets of that firm. In order to secure complete title to the $650,000 bonds of the road in the hands of the assignee, a contract was presented at the meeting, by which the creditors agree to receive the bonds at 40, in part satisfaction of the creditors' claims. A number of the creditors signed the contract and an effort will be made to obtain the signatures of all the creditors.

St. Joseph & St. Louis.—This road, extending from North Lexington to St. Joseph, Mo., 76 miles, which was formerly a part of the Wabash system, will become a part of the Atchison system. Winslow Judson and W. D. B. Motter, President and Vice-President of the company, have bought in the bonds to this end.

St. Louis, Arkansas & Texas.—Twenty-two miles of track have been laid from Greenville towards Fort Worth, Tex.

All the grading is finished between Fort Worth and Plano, Tex. Track is laid about 40 miles from Commerce.

St. Louis & San Francisco.—The extension from Jenson to Mansfield, Ark., 19 miles, has been opened for business.

St. Paul, Minneapolis & Manitoba.—Regular trains were put on the extension between Assiniboine and Great Falls, Mont., on Oct. 31.

San Antonio & Aransas Pass.—It is just possible that the company may build from Corpus Christi, Tex., its present terminus, southward 150 miles to Brownsville, the southernmost city of the United States. Brownsville has no connection with the American railroad system. A narrow gauge road extends from it to Point Isabel, on the coast, 22½ miles. Across the Rio Grande River is the Mexican city of Matamoras, with 20,000 inhabitants, situated on an uncompleted branch of the Mexican National. Brownsville offers a subsidy of $100,000 to the company that will build to the city.

The company has commenced work on the Collins branch of its line. This leaves the main line at a point 11 miles south of Beeville, Tex., and will intersect the Texas Mexican road from Corpus Christi to Laredo, between San Diego and Collins.

San Francisco, Clear Lake & Humboldt.—Seventeen miles of this California road have been graded, and contracts for 20 miles more have been let.

Santa Rosa & Carquinez.—The grading is completed from Napa Junction to Glen Ellen, Sonoma County, Cal.

Seattle, Lake Shore & Eastern.—The first train went over this road from Seattle, W. T., to Squak, last week. The distance is about 25 miles.

Selma & Cahaba Valley.—The survey of this road from Selma, Ala., to Bessemer was begun this week. It is stated that the road will be in operation within 10 months.

Seymour & Southwestern.—Organized to build a road from Seymour, Ind., to Orleans or Paoli, via Brownstown, 40 miles. Capital stock, $500,000.

Southern & Western Air Line.—The survey is now being made on this road from Shelby to Cranberry, N. C., about 90 miles. Different counties have subscribed $100,000 to the project.

Texas & Pacific.—The sale of the Texas division will be made at Marshall, Tex., on Nov. 8, and of the New Orleans division at New Orleans on Nov. 10.

Union Pacific.—General Manager Potter announces that the Cheyenne & Northern will be pushed 150 miles north of its present terminus at the mouth of Cottonwood Creek over the North Platte River, 30 miles southeast of Douglass, Wyo. This will take the road to Buffalo, Wyo., in the centre of the grain region.

Western New York & Pennsylvania.—The company has filed a mortgage for $15,000,000 in Buffalo on all the property of the road in New York and Pennsylvania.

West Jersey.—It is said that the Delaware River, the Maurice River, and Port Norris lines, the Hollybeach, Sea Isle City and other branches of this road, will be consolidated.

West Shore.—A handsome new station has just been completed in Hoboken, N. J. It is 25 ft. wide by 100 ft. long.

TRAFFIC AND EARNINGS.

East-bound Shipments.

The shipments of flour, grain and provisions from Chicago eastward to seaboard points, amounted last week to 31,250 tons, against 25,680 tons for the week previous, an increase of 5,570 tons. The percentages carried by the various roads were as follows: Chicago & Grand Trunk, 12.0; Michigan Central, 18.4; Lake Shore & Michigan Southern, 14.9; Pittsburgh, Fort Wayne & Chicago, 20.1; Chicago, St. Louis & Pittsburgh, 11.3; Baltimore & Ohio, 6.9; New York, Chicago & St. Louis, 16.1; Cincinnati, Indianapolis, St. Louis & Chicago, 0.3.

Discrimination in Alabama.

The Alabama Railroad Commission has decided, upon complaint entered by a shipper, that a special reduced rate to a certain manufactory in Selma is unwarranted and orders it discontinued. Cotton-seed is shipped from local points west of Selma over the East Tennessee, Virginia & Georgia, and billed to Selma at two different rates. That which is delivered to mills in Selma is billed at 5½ cents per 100 lbs., while that which is sent on to other mills east of Selma is charged at 8 cents. The Commission says that the provision of the law which allows special rates to be given for the purpose of developing any special industry is restricted to cases where aid or assistance is needed to develop or bring into life some industrial enterprise not yet firmly established, and which in its nature justifies some aid from railroad companies to make it successful. The circumstances of the respective cotton-seed oil mills are not such as to warrant taking advantage of this provision of the law.

Coal.

The coal tonnages for the week ending Oct. 29 are reported as follows:

	1887.	1886.	Inc. or Dec.	P.c.
Anthracite	729,653	815,120	D. 85,467	10.4
Bituminous	327,320	257,776	I. 69,544	26.9

The Cumberland coal shipments for the week ending Oct. 29 amounted to 80,159 tons, and for the year to that date 2,676,340 tons.

Cotton.

The cotton movement for the week ending Oct. 28 is reported as below, in bales:

	1887.	1886.	Inc. or Dec.	P. c.
Interior markets:				
Receipts	192,049	192,758	D. 709	0.3
Shipments	152,996	149,282	I. 3,714	2.4
Stock	268,753	228,997	I. 39,756	17.4
Seaports:				
Receipts	294,934	258,483	I. 36,451	14.1
Exports	217,919	154,611	I. 63,308	40.9
Stock	623,712	623,535	I. 177	.0

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

Month of September:

	1887.	1886.	Inc. or Dec.		P.c.
Allegheny Valley	$180,959	$159,615	I.	$21,344	13.4
Net	71,769	62,133	I.	9,636	15.5
Balt. & Potomac.	129,034	123,756	I.	6,278	4.2
Net	62,934	60,433	I.	3,501	5.7
Cam.&Atl.& Brs.	62,504	59,677	I.	2,827	4.7
Net	9,255	19,904	D.	10,649	98.7
Canadian Pac	1,063,206	955,962	I.	107,244	....
Net	377,966	375,189	I.	2,777	....
Cen. of Georgia.	780,134	583,457	I.	196,677	33.7
Net	364,231	248,785	I.	115 446	46.4
Cl., C., C. & I.	459,139	442,956	I.	16,183	36.7
Net	208,960	209,314	D.	354	.1
Cleve. & Cant.	36,744	33,867	I.	2,937	8.6
Net	13,261	7,259	I.	6,002	82.2
Det., B. C. & Al.	43,509	.....		.....	....
Net	17,528	.....		.....	....
Grand Rap. & I.	272,392	235,862	I.	36,530	15.4
Net	89,190	92,512	D.	3,322	3.5
Norfolk & West.	404,724	319,225	I.	85,499	26 7
Net	186,306	137,855	I.	48,451	35 2
Northern Central.	452.632	472.945	D	20,313	4.2
Net	61,786	159,786	D.	98,000	61 3
N. Y. C. & H. R.	3,438,555	3,058,548	I.	380,007	12.4
Net	.....	.....		.....	....
Phila. & Read	1,968,613	1,834,114	I.	134,499	...
Net	1,055,624	775,926	I.	279,698	...
P.& R. C. & I. Co.	2,135,081	1,648,815	I.	486.266	29.4
Net	207,310	Def. 142,368	I.	349,678	....
Phila. & Erie	339,523	357.034	D	17,511	4 9
Net	232,547	234 141	D.	1,594	.6
Union Pacific	2,743,980	2.507.793	I.	236,187	9.4
Net	1,377,247	995,396	I.	382,551	3.8
Total (gross)	$11,028,685	$9,755,018	I.	$1,293,647	12.2
Total (net)	4,320,086	3,236,265	I.	1,197,740	....
			I.	113,919	..
Net			I.	1,083,821	33.4

Three months—July 1 to Sept. 30:

Nash., C. & St. L.	$801,506	$663,054	I.	138,452	20.7
Net	375,133	279,222	I.	95,911	34 3
Northern Pac	3,916,372	3,699,057	I.	211,315	5.7
Net	1,841,651	1,962,511	D.	120,860	6.1
N. Y. C. & H. R.	9,550,074	8,717,147	I.	832,927	9 6
Net	.....	.....		.....	....
N. Y. & N. E	1,142,802	1,115,817	I	26,985	2 4
Net	425,856	457,998	D.	32,142	7.0

Nine months—Jan. 1 to Sept. 30:

Allegheny Val	$1,483,551	$1,321,710	I.	$161.841	12.2
Net	554.657	476,217	I.	78.440	16 4
Balt. & Potomac	1,063.905	986,129	I.	77,776	7.8
Net	395,598	392,896	I.	2,702	.6
Cam.&Atl.& Brs.	572.782	500.640	I.	72,142	14.4
Net	155,932	136,788	I.	19,144	13.9
C., St. L. & P.	4,220,267	3,471,052	I.	749,215	21.5
Net	1,105,712	535,102	I.	570,610	106 6
Central of Ga.	4.438,492	4.074,589	I.	363,903	8.9
Net	1.346,410	1,006,936	I.	339,474	33.7
Cl., C., C. & I.	3.321,041	3,018,853	I.	302,188	10.0
Net	1,263,163	1 092,918	I.	170,245	15 5
Cleve. & Canton	271,379	262.311	I.	9,068	3 4
Net	74,260	57,801	I.	16,459	28.4
Gr. Rapids & Ind.	2.161.381	1.798 3.0	I.	363.031	20.1
Net	718,827	591.014	I.	127,813	21.6
Mexican Cen.	3,429.955	2,690,771	I.	739.184	27 4
Net	1,492,002	844,137	I.	647,865	76.7
Norfolk & West.	3,004,003	2,312,299	I.	691 704	29.9
Net	1,210,296	919,983	I.	290,313	31.5
Northern Central.	4,679.189	4,006 834	I.	672,355	16 7
Net	1,725.105	1,379,654	I.	345,451	25.0
Phila. & Read	16,003,531	14,194,341	I.	1,809,190	12.8
Net	8,305,552	5.677 044	I.	2,628,508	46.3
P. & R.C & I. Co.	13,539,282	10,878,475	I.	2,660.807	15.2
Net	863,493	Def. 1,680,622		2.544,115	....
Pennsylvania:					
E. of Pittsburgh.	41,073,675	36,866,283	I.	4,187,392	11 3
Net	14,123,654	12.971,832	I.	1,151,822	8.8
West. J. and Brs.	1.167.153	1,077,141	I.	90.012	8.3
Net	455.745	418,849	I.	36,896	8 8
Total (gross)	$100,409,586	$82,078,236	I.	$11,471,450	13.9
Total (net)	33,790,406	24,820,549	I.	8,969,857	36.1

Year to June 30:

Chi. & East. Ill.	1,934,060	1,724,564	I.	209,496	12.1
Net	854.012	767,427	I.	86,585	11 2
C., L. St. L. & C.	2,684,723	2,426 413	I.	258,310	10.6
Net	984,127	886,352	I.	97,775	11.0
Louis. & Nash.	15,080,585	13,177,018	I.	1,903,567	14.4
Net	6,033,531	4,963,723	I.	1,069,808	21.5
Nash., C. & St. L.	2.774,248	2,188,110	I.	586,138	26 7
Net	1,195,637	865,252	I.	330,385	38.1
Northern Pacific	12,789,446	11,730.527	I.	1,058 919	9.0
Net	5,616,428	5,574,263	I.	42,165	0.8
St. P., M. & Man.	8,028.448	7.321,736	I.	706,712	9.6
Net	3 9 :9,038	3,663,333	I.	265,705	7 2
Tol. & Ohio Cen.	961.406	697,989	I.	263,417	37.7
Net	316.018	138,848	I.	177,170	127.6
Vicks., Shre. & P.	564.317	484,812	I.	79.505	16.3
Net	144,899	90,454	I.	54,445	60.1
Total (gross)	$14,817,233	$39.751,169	I.	$5,066,064	12.7
Total (net)	15,073,690	16,949,652	I.	2,124,038	12.5

Early reports of monthly earnings are usually estimated in part, and are subject to correction by later statements.

The Inter-state Commission.

On Oct. 27 the complaint of the Boston Chamber of Commerce concerning rebates on grain and produce exported from Boston was heard. Several Boston wholesalers testified to a great falling off in their sales to points east of Boston by reason of the diversion of trade to New York as a result of the rates established since the Inter-state Commerce act went into force. On Oct. 28 General Traffic Manager Mills, of the Boston & Albany, was examined. He believed that should the Boston rate which applies to numerous points in New England, some of them beyond Boston, be decreased, the connecting lines which now accept their pro rata share of it would refuse to continue the arrangement, and that this would leave southern New England practically to the Pennsylvania road without the benefit of competition. William O. Blaney, grain merchant of Boston, testified to the fact that vessels bringing ice to Boston would take return cargoes of grain to points beyond Portland cheaper than the same freight could be sent to nearer points. William H. Lincoln, agent of the Leyland steamers, declared that Boston's steamship lines could bear no further burdens, and that if drawbacks were discontinued Boston would have to import through New York or elsewhere. Nathan Guilford, General Traffic Manager of the New York Central, said that the rate to Boston was just and reasonable and that New York rates were too low, but were governed by water competition. Vice-President Hayden, of the New York Central, said that a reduction of the Chicago-Boston rate would necessitate a reduction of at least 10,000 other tariffs. Arguments were postponed until Nov. 17.

Land explorers' tickets, which have long been issued by most of the roads having land to sell, are declared illegal by a decision in the case of W. U. Smith against the Northern Pacific, just announced. The complainant applied for a ticket at land explorers' rates, not claiming any intention of seeking land, and was refused; but he brought no proof, and so is given no redress. But, under Section 15, which provides that the Board must condemn illegal practices whenever it is satisfied that such exist, Commissioner Walker, who gives the opinion, goes on to relate the facts and to order that the tickets referred to must be no longer sold. The tickets are of two forms, round trip land exploring rebate, and settlers' one-way land. They are sold at about 60 per cent. of the first-class rate, and a further discount is made to actual purchasers in the form of a rebate of half the price of a round trip, and the whole cost of a single trip ticket. The tickets must be bought of the Land Commissioner.

The decision continues:

The company may sell its lands at such price as it may see fit to establish therefor, and may accept whatever it sees fit in payment; and when it makes a discount from the selling price of an amount equal to the whole or to any part of the fare paid by the purchaser in inspecting or emigrating to said lands, it does not appear to violate any of the provisions of the Act to regulate commerce.

But when the defendant puts on sale in an emigration office, special tickets at reduced rates, which are not open to the public at large, but which are used by passengers upon its ordinary trains, justification for which is claimed in the fact that they are a valuable auxiliary to the company's sales of real estate, it certainly demands and receives from its ordinary passengers more for the same service than it collects from persons who, truthfully or otherwise, represent themselves to be prospective purchasers of land or settlers. This course of dealing is in direct contravention of the second section of the Act to regulate commerce. The fact that the custom tends to stimulate the sales of the company's land or its future business, cannot be regarded as an excuse for its continuance. Many companies would very likely be glad to stimulate their freight business by offering special rates or even free transportation to shippers or to traveling salesmen; and other companies which are engaged incidentally in the sale of coal or any other outside enterprise, could largely increase their revenues by judiciously employing the facilities of transportation at their disposal; but all these methods are in direct opposition to the spirit and letter of the Act to regulate commerce, and are illustrations of the evils which the act was designed to remedy. In the transportation of passengers carriers are performing a public duty under franchises granted by the state, and are subject to the rules of law which require absolute impartiality to all, when the circumstances and conditions are substantially similar. The fact that their own interests may be promoted to some extent by swerving from this rule, cannot be regarded as sufficient to warrant a departure from the obvious language of the statute. To the claim that settlement of the country should be encouraged it is replied that that is the business of Congress; and the suggestion is made that settlement can be stimulated enough by ordinary discounts, or is, perhaps, stimulated enough already. Moreover, "settlers are carried every day on roads in all parts of the country." Travelers coming through from Eastern points, who have purchased tickets to their ultimate destination, may not be informed of the opportunity to obtain a special rate at the St. Paul land office; the same train may, and no doubt often does, contain "settlers," some of whom are charged much more than others. And again it is quite possible for the defendant to be imposed upon by persons who claim to be explorers or settlers, when in fact their actual intention is very different. These considerations illustrate the practical impossibility as well as the inevitable unfairness of attempts to discriminate among passengers enjoying the same accommodations, by reason of any special classification founded upon means, occupation, or purpose.

It will be very difficult to find any principle upon which the transportation of passengers in our country can be impartially and fairly carried on short of maintaining the rule of absolute equality of payment from all persons enjoying the same accommodations.

A decision (by Chairman Cooley) has been rendered in the case of D. F. and E. A. Allen against the Louisville, New Albany & Chicago. The road takes grain from Indianapolis north to Michigan City (154 miles) to go to New York by the Michigan Central, at a through rate of 23 cents (1055 miles), that being the rate over more direct lines from the same point. At the same time grain is taken from Frankfort, north of Indianapolis, to South Wanatah (84 miles further north but short of Michigan City), where it is delivered to the New York, Chicago & St. Louis for New York City, the through rate in this case being 25 cents (1,008 miles). The claim of plaintiffs is that the fourth section (long and short-haul clause) is violated, but although the road receives more per mile on the short haul "included within the longer," it appears that the distances are such that the gross charge per ton is not higher for the shorter distance, and so the complaint is dismissed. The proportions received by the defendant are, per ton:

Indianapolis to Mich. City	67 cts.
Proportion to South Wanatah	53.6 "
Frankfort to South Wanatah	41.6 "

The shippers do not generally use either of these routes, but sent a single shipment from Frankfort via South Wanatah, so as to make a complaint; it was hoped that this would compel a reduction to 23 cents and thus induce the *direct line* from Frankfort to carry at the same figure. The Commissioner goes on to say that even if the through rates were illegal, an order on the defendant road would have no effect, because other roads which have not been given a chance to defend themselves would be sharers in the responsibility.

A decision was rendered on Nov. 2 in the case of the Boards of Trade of Farmington, Northfield, Faribault and Owatonna, Minn., against the Chicago, Milwaukee & St. Paul. The towns on the river division of this road ship grain to Chicago at 7½ cents per hundred, enjoying this low rate because they are on the direct line between St. Paul and Chicago, between which places the rate is kept down by the strong competition. The complaining towns are on the other line of the same road, substantially parallel to the river division, but further west, and somewhat further from Chicago. They have to pay 15 cents to Chicago, and this inequality between towns on parallel lines so near each other works to the disadvantage of the least favored. The question is complicated by the fact that the through rate from points in Dakota, on the Chicago, Milwaukee & St. Paul (west of St. Paul) through to Chicago, are the same (25 cents) over both these divisions, and the privilege of milling in transit is granted at points south of St. Paul on both lines, though it does not appear that much, if any, grain is shipped from points west of St. Paul under this tariff.

The decision holds that the complaint is well founded; that the rate on the Minnesota division (longest route) is relatively too high. While a reasonable differential rate may be allowed on that division on account of greater distance and probable larger expense, and the greater stringency of the competitive forces on the River Division, the difference above the present rate on the River Division should not exceed 2½ cents a hundred; that it is not a sufficient compliance with the law that rates are reasonable in themselves, but they should be so relatively reasonable as to protect communities and business against unjust discrimination; that when the same carrier operates parallel lines, and for any cause accepts low rates on one line, it should furnish sufficient corresponding advantages to the patrons of the other line to prevent undue prejudice and disadvantage, and to preserve the substantial equality contemplated by the statute.

Florida Rates.

The tariffs prepared by the Florida Railroad Commission in accordance with the law lately passed in that state, and which were to have gone into effect Nov. 1, have been suspended until Dec. 1, to give time for the consideration of the objections presented by the roads.

Passenger Rate Cutting.

The Chicago & Alton has charged the Wabash with violating the agreement between the two roads by selling through tickets to California at a slight discount. The Wabash claims that the Alton has violated the agreement by furnishing a special train for a theatre party between Chicago and St. Louis. The Chicago, Milwaukee & St. Paul complains that its competitors have sold tickets in San Francisco for Chicago and points east thereof at a reduction of several dollars. The Ohio & Mississippi has reduced ticket rates from St. Louis to New York $1.50 on first-class and 50 cents on second. It is reported that the Minnesota & Northwestern has been cutting rates between Chicago & St. Paul by using the coupons of excursion tickets between St. Louis and St. Paul via Chicago.

Emigrant Rates.

The revised emigrant passenger tariff from the seaboard westward, issued by the Trunk lines, went into effect Nov. 1. There are minor changes in the ticket fares, but the principal change is in the baggage rates. Emigrants are now allowed 150 lbs. free, the same as first-class passengers, and the extra baggage rate has been reduced from 20 to 15 per cent. of the ticket fare. The rates are given in English and German money, as well as in dollars and cents.

Traffic Notes.

The Atchison, Topeka & Santa Fe and its controlled lines are reported to have agreed to the Eastern Trunk Lines' conditions concerning the non-payment of ticket commissions.

The Illinois Central south of the Ohio River has adopted the Southern Railway & Steamship Association's freight classification.

The winter tourist rate from Cincinnati to Jacksonville, Fla., and return will, it is reported, be $44.20 this season, an increase of $7.65 over last season's rate.

ANNUAL REPORTS.

Boston & Albany.

The annual report to the stockholders for the year ending Sept. 30, 1887, is issued. The annual meeting is to be held on the second Wednesday in December. The mileage operated is not given. The previous fiscal year it was 387.4 miles.

The equipment includes 252 locomotives, 399 passenger, baggage and postal cars, and 6,406 cars of all other kinds; an increase of 7 locomotives, 13 passenger, 1 baggage and 246 freight cars, and a decrease of 40 in other kinds.

The general balance sheet condensed is as follows:

Liabilities.

Capital stock	$20 000,000
Funded debt	10,858.000
Unclaimed dividends and interest	402.653
Dividends due Jan. 1, 1888	40,500
Improvement and sinking funds	1 072,718
Balances due	307,575
Profit and loss	427,215
	$33,108,661

Assets.

Cost of road and equipment	$27,514.117
Springfield & Northeastern road	438.358
Newton Highlands branch	411,400
Riverside branch	231,866
Hudson River bridges	475,485
Materials	352.806
Real estate and land	97,176
Trustees improvement fund	1,372,718
B. & A. stock	1,044.405
Cash	752,086
Other assets	418,164
Total	$33,108 661

There have been no changes in the stock, bonded debt, nor have any changes been made in construction account; but heavy expenditures in buildings and equipment have been charged to expense account.

The earnings for the year were as follows:

	1886-7.	1885-6.	Inc.		P c.
Freight	$4,493,588	4,299,083	I.	194 505	4.5
Passengers	3,605,979	3,294,003	I.	311,976	9.4
Miscellaneous	826,178	705,647	I.	120,531	17.0
Total	8,925,745	8,298,733	I.	627,012	7.5
Operating expenses	6,473,636	5,810,388	I.	563,248	9.6
Net earnings	2,452,109	2,488,345	I.	63,764	2.5
Gross earn. per mile	23,064	21,611	I.	1,453	6.7
Net earn. per mile	6.594	6,480		.....	1.7
Per cent. of expenses	71.4	70		....	...

The expenses were divided as follows:

	1887-6.	1886-5.	Inc. or Dec.		P.c.
Maintenance of way	958,372	1,029 612	D.	71,240	6.9
Maintenance of cars	904.131	640.485	I.	263,646	41.1
Maintenance of engines	478,108	471,987	I.	6,121	1.2
Maintenance of buildings, docks, etc	235.417	136,614	I.	98.803	72.3
Transportation expenses	3,652,012	3,396,994	I.	255 018	7.5
General expenses	145,597	134,696	I.	10,901	8.0

The income account condensed was as follows:

Net income as above		$2,552,109
Interest	$662 900	
Dividends (8 per cent)	1,599,565	
Rentals	78,000	
		2,340,465
Surplus		211,644
Surplus Sept. 30, 1886		215,570
Total surplus not divided		$427,215

The traffic for the year was as follows:

	1886-7.	1885-6.	Inc. or Dec.		P. c
Pass carried	10,715,345	9,726,907	I.	988,438	10.1
Pass. miles	191,843,184	177,787,439	I.	14,055,745	7.8
Tons carried	3,674,589	3,506 476	I.	168,113	4.7
Ton miles	406,030,750	390,464,378	I.	15,566,372	3 9
Average rate:					
Per pass. mile	1.88	1.85 cts.			
Per ton mile	1.11	1.10 cts.			

The cost per passenger and per ton one mile was 0.807 cents, an increase of 3.6 per cent. over last year.

The President says that the great increase in expenses is due to higher cost of labor and material, increased traffic and expenditures on buildings and equipment.

The depot question at Springfield remains unsettled, and the passenger accommodations there are wretchedly insufficient; but it is thought unwise to make any expenditure to better them until the city authorities consent to a plan for the separation of the grades of Main street and the railroad. An agreement has been made with the city of Boston by which the crossing at Cambridge street, in Allston, is to be carried overhead, and the company is to pay the city $40,000.